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Contents for November 1952

Trees at Work, Story of the Tree Farm	The Rotarian	1
Feed Lambs Like Hogs?	Farm Journal	6
New Mobile Milking Parlor Unit	Electricity on the Farm	7
Vegetable Growing, an Exciting Business	American Agriculturist	9
Value of Soil Test Demonstrated*	Extension Service	12
Farmer's Legal Quiz Box	J. H. Beuscher	13
Outlook Favorable for Feeders*	Colorado Extension	14
Tractor Tire Tests	Agricultural Engineering	15
Pregnancy Test for Cows*	Capper's Farmer	17
What Makes Good Incomes on Dairy Farms	Pennsylvania Farmer	18
McGregor vs. Mesquite	The Hereford Journal	21
What's New in Poultry Feeding	American Poultry Journal	24
Electrons Ride on Bug Dust	Agricultural Engineering	27
Tractor Mounted Gutter Cleaner*	Successful Farming	29
Raise Healthy Calves the Roughage Way	Ohio Farmer	30
New System Builds Fertility and Keeps It	Kansas Farmer	33
Install Infra-Red Heat Lamps Safely	National Safety Council	38
History of Beef Cattle in U. S.	The Cattleman	41
Heat Pumps for Farm Homes	Capper's Farmer	46
Two Flocks Recommended for Poultrymen*	Texas Extension	48
The Weevil Meets His Match	Farm Journal	49
Can You Pump Your Neighbor Dry?	Business Week	51
Predict Good Business Conditions Through '52*	Rutgers University	55
Fitting Concentrates to the Roughage	Guernsey Breeder's Journal	56
How to Clear Pond Water	Successful Farming	63
How Much for Weeds?	The Farmer	65
Economic Outlook for Farmers*	Wisconsin Extension	67
Poultry House Ventilation	Poultry Tribune	68
Antibiotics for Dairy Animals	Farm Research	71
Rescuegrass for the Southeast	Soil Conservation	73
Saving Sweat in the Silo	New Jersey Farm and Garden	76
How to Profit With Hogs	Hog Breeder	79
Insurance for Farmers	USDA Bulletin 2016	87

* Short Features — a few of the many in this issue.

The Farmer's Digest

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It's a great pity that things weren't so arranged that an empty head, like an empty stomach, wouldn't let its owner rest until he put something in it.

— Olin Miller

It's a pity, too, but—judging by income figures—a fair share of empty heads are on American farmers. Farmers who **don't read about farming** pulled average hourly farm earnings down to 69c in 1950. This, in a country which has a minimum wage of 75c per hour.

At a recent Extension meeting, a prominent speaker suggested that County Agents spend more time with these 'poor" farmers and less with the good farmers. "Good farmers," he said, "will read about new opportunities and new practices and put them into effect themselves. "Poor" farmers have to be told, shown and pushed."

It all goes to show that farming is like any other business or profession. You have to keep informed to succeed with it. That is why Farmer's Digest is so important to you . . . why you should keep it coming every issue. Only Farmer's Digest gives you so much usable information in palatable, easy-to-read form at so low a cost. In Farmer's Digest, you get the very best from more than sixty U. S. and foreign farm magazines.

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The Farmers Digest
Volume 16 November 1952 Number 5

Trees at Work

. . . Story of the Tree Farm

Condensed From The Rotarian

Robert M. Hyatt

EARLY in 1941 a large lumbering firm in the state of Washington launched a project that has since become the greatest tree replenishing program ever conceived. Actually, there was nothing dramatic or revolutionary about the undertaking. The men of this company simply planted 120,000 acres of logged-off land in seedling trees, posted the tract with signs reading "Reforestation Project," and went about their business.

Now a decade ago, logged-off land in the Pacific northwest of the United States was considered pretty worthless. Fishermen, hunters and berry pickers tramped over this property, glanced at the new signs—and left burning cigarette butts and undoused campfires in their wake. Despite costly prevention measures, which the company hastened to install, fire losses were high. In desperation, officials of the firm—the Weyerhaeuser Timber Co. — took their problem to the people of the little town of Montesano, bordering the tract.

It was Chapin Collins, editor-publisher of the town's only newspaper, who came up with the solution. Said he: "Your signs 'Reforestation Project' leave the

Reprinted by permission from The Rotarian,
Chicago 1, Illinois

public cold. Why not call it a Tree Farm? Everyone knows what a farm is and what it's for. Believing it's a farm, folks will respect your property."

Weyerhaeuser put up signs reading "Tree Farm." They explained the purpose of the new planting. Other newspapers picked up the story. Overnight the tract became a show place. People began to realize that trees could be grown commercially just like potatoes or wheat.

And that was the beginning of the American Tree Farm system, a phenomenal movement that in a decade has spread to 29 of the nation's most heavily timbered states. Today there are 3,697 certified Tree Farms with a total acreage of 25,763,713. Acreage is increasing at the rate of three million a year. Ownerships range from tiny three acre plots to industrial forests as large as Rhode Island. Farmers and nonindustrial owners make up about 70 per cent of these Tree Farms.

The idea itself, of course, was not new. For a century, European foresters have used similar tree farming practices. They have grown their timber from certified seed selected from exceptional trees — those with the smallest limbs, the straightest trunks and the swiftest rate of growth. Only by careful conservation have such timber exporting countries as Yugoslavia and Austria maintained their logging industries through centuries.

It was not thus in the history of the New World. Of course, 300 years ago there was concern about the wood supply just as now, but then there were too many trees. The great woods were an almost impenetrable barrier to pioneer progress. They made cultivation of the land a Herculean task. Down with the woods!

The axes of nearly three centuries took their toll, and by about 1900 America faced a serious timber shortage. There had been sporadic warnings that the forests wouldn't last forever with indiscriminate logging. As far back as 1681, William Penn decreed that for every five acres his settlers cleared, one acre must remain in forest. There were several halfhearted attempts in the 18th and 19th centuries to control logging. They failed.

It was not until the formation of the American Forestry Association in 1875 that any real effort was made to set aside certain forested areas. These became the national forests.

For years there was little supervision or protection of these wooded regions. Today there are approximately 13,000 foresters in the United States, of which about 5,000 are employed in private industry or consulting work. At the turn of the century there

were but a handful, born or trained in Europe. And while it was known half a century ago that insects and disease destroyed far more trees each year than fire, scientific control of these menaces is now only six years old. Selective logging — taking only prime trees and those growing too close together—is also new. The old-timers "clear cut"—or took all.

Just 30 years ago the United States government wrote off the south as a timber producer. In 1919 Chief Forester Henry S. Graves voiced this dark prediction: "The bulk of original yellow pine in the south will be exhausted in 10 years, and within five to seven years more than 3,000 manufacturing plants will go out of existence."

When he made that statement, Mr. Graves could not have foreseen the terrific impact of the development of the kraft-pulp industry on the forest economy of the south. Nor could he have dreamed that two decades hence some Washington timbermen would evolve a scheme that would change the forest picture of the entire nation.

The south today is one of the largest wood growing regions in the United States. With its increasing numbers of woodlot pulp and timber producers, it grows 40 per cent of the country's lumber and half the pulpwood used in making paper, plastics, chemicals and thousands of other useful wood products. Southern Tree Farms number 1,669 of the United States' total. Mr. Graves should count Dixie's wood processing plants now!

The Tree Farmers are not only replenishing timber supplies, but they are providing a wide and watchful protection brigade over the forests. They are helping agriculture, reducing erosion and assisting flood control by planting denuded and logged-off areas, thus creating valuable watersheds. By clearing the woods of sawdust and waste wood, they are cutting down on fires and wood eating beetles. In the old days, such refuse was left where it accumulated because there was no use for it. Today it has a cash value.

For example, in the early 1900's, when standing timber was available at 50c to $1 a thousand board feet, it was more economical for a sawmill to pack up and move than to grow its own trees. Then, if 37 per cent of a tree *trunk* reached its ultimate use, it was considered an achievement. Today in many areas, about 70 per cent of the entire tree—trunk, branches, tops, bark, stumps and sawdust — goes into useful products.

Increased use has brought increased income — and employment. There are more than 60,000 United States firms engaged in wood processing of some sort,

and they employ two million workers.

To become a Tree Farmer, all you need is a stand of timber, or acreage that you wish to plant in seedlings. You simply contact your local forester or the agency of the Tree Farm system in your state. He makes an inspection of your trees, marks those ready for cutting, and specifies the best and most profitable use for each. Of course, you must agree to establish firebreaks, fence out cattle, and maintain an adequate fire fighting outfit on or near your farm. This service is free. You get all the profit.

To give you some idea of just how much profit is possible from woods under Tree Farm supervision and instruction, take the case of Howard Olson, a young veteran of World War II. Back from service, he bought a farm near Aveca, Wisconsin, that included 40 acres of timber. Soon afterward a railroad tie operator offered him $2,500 for the entire wood tract. Olson wasn't satisfied. He called in a forester, who inspected his trees and estimated they would cut 400,000 board feet of saw timber. Value: $8,000!

The forester then showed Olson how he could eat his cake and have it, too. He could cut 20,000 feet of timber every year and apply the proceeds toward the mortgage on the farm. At the end of 10 years the entire farm of 280 acres would be paid for and Olson would still have a productive woodland with about 300,000 board feet of timber—all from 40 acres of trees. Needless to say, Howard Olson took his advice and is an enthusiastic Tree Farmer.

America's forests cover 624 million acres, an area as large as all the states east of the Mississippi river, plus Kansas and Louisiana. It is generally agreed that 461 million acres of productive timberlands are adequate to supply the nation's requirements in wood, provided they are managed properly and their products used wisely. That's one of the big aims of the Tree Farm system.

With modern fire protection, such as given by Tree Farmers, the total area of forest regions needing tree planting is diminishing. Nature is proving her ability to reforest idle acres. In 1936 the United States Forest Service estimated 21 million acres in the Great Lakes states were in need of planting. By 1944 so much of this area had reforested itself (due to fire control) that only about 14 million acres remained unstocked.

South Carolina, which became a Tree Farm state in 1946, is making great strides with her new reforesting plans. Some years ago in that state the average farm consisted of 48 per cent woods, 43 per cent cropland, and 9 per cent

pasture. In most instances the wood was "forgotten acres" — returning a meager 7 per cent of the yearly income by supplying fence posts and rails and a few building boards.

That picture is rapidly changing. The case of Carolinian Robert N. Cole is typical of hundreds of other farmers of that area who were bitten by the Tree Farm bug. Ten years ago, Cole began to cut selectively his 197 acres of timberland, manage it properly, and market it wisely. In that time he has realized $25,660—which is really putting the "forgotten acres" to work!

But there's still another way to look at the results of the Tree Farmers. In 1918, timbermen in the United States were cutting 5.8 trees for each new tree that sprouted. Today the ratio is one to one. And as the Tree Farm acres spread, the United States may soon be rebuilding a measure of the great timber resources it once had, making way for more wood industries, and more employment and more goods for everyone.

New Pasture - Making Tool

A new machine built on lines suggested by a pasture specialist at Mississippi State college can seed, fertilize and renovate pasture land without sacrificing the established sod.

The all-metal machine looks much like a grain and fertilizer drill. Below the hopper on a frame are seven chisel pointed boots through which seed and fertilizer fall. Each boot has a rolling coulter ahead of it. The foot, at the lower end of each boot, has a long, thin point of very hard metal. Spacing between the feet is 10 inches, but any of the feet can be removed for spacing multiples of 10 inches. The boot and foot assembly can be easily moved with the tractor hydraulic system.

Engineers say that scarcely a trace could be found in late spring of narrow furrows made by the machine in slicing through sod the previous fall. Cattle can keep right on grazing a pasture that is being improved. Satisfactory renovation can be done in heavy sod but a high cover crop should be clipped to a height of five or six inches. In extremely long grass the incisor boots tend to operate like a rake, require frequent cleaning.

Any size seed from fescue to winter peas can be distributed. The hopper has two compartments so fertilizer and seed can be handled at the same time. —*Capper's Farmer*

Feed Lambs Like Hogs?

Condensed From Farm Journal

HAVE you tried feeding lambs from a self-feeder, like hogs? It's ticklish business, many sheep feeders will tell you, and you've got to be mighty careful — you might lose a lot of lambs.

But a lot of farmers do it successfully, and put faster gains on their feeder lambs that way.

George Young and his son, John, of Nemaha County, Kansas, say that their self-fed lambs go to market 30 days earlier than when they hand feed.

Their lambs come around February 1, and are started on shelled corn and protein supplement as soon as they're old enough to eat. They also get coarse brome or prairie hay—young says alfalfa is too "washy."

The Youngs built two self-feeders, each holding 200 bushels of shelled corn. They hook an electric light on one of the feeders and let it burn all night; lambs eat nearly twice as much from the lighted feeder as from the other one.

They figure that the self-fed lambs eat an average of a pound more shelled corn per head per day than those that are hand fed.

The youngs have less than 1½ per cent death loss, and give a lot of credit to a commercial sheep supplement, containing 28 per cent protein, plus vitamins and minerals, which they mix with the corn. They figure that each lamb eats about two and a quarter pounds of shelled corn per day, two ounces of the supplement, and three quarters of a pound of hay.

Besides feeding out their own lambs this way, the Youngs buy feeder lambs off the range. But they don't put them on full grain feed immediately—that's the way to lose them from enterotoxemia —overeating disease.

They give them plenty of hay and start them on grain gradually —get them up to full feed in about five days.

By feeding hay and the supplement, the Youngs get by the overeating disease trouble without vaccinating. If you want to try self-feeding, however, it's cheap insurance to vaccinate. And that goes for lambs that are turned into a field of corn or peas, too.

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Philadelphia, Pennsylvania

It Milks the Cow, Cools and Weighs Her Milk, Then

Takes It to the Milk House for Canning

NEW MILKING PARLOR MOBILE UNIT

Condensed From Electricity on the Farm

A. V. Krewatch

University of Maryland

W. R. ROOP of Keymar, Maryland, is a farmer with modern ideas and an imagination. He has built, with the help of dairy equipment people, a milking, cooling, holding, milker unit, such as a farmer might dream about for the future. "Time and labor," says Mr. Roop, "is cut in half. Milk is cold (down to 45 degrees Fahrenheit) 10 seconds after it comes from the cow."

Mr. Roop built a rectangular stainless steel cabinet with vacuum sealed doors fitted with glass windows. Inside the cabinet a simple surface cooler was installed. Insulated cold water lines from the 10 can milk cooler tank in the milk house supply it with refrigerated water. Milker heads for three units are a part of the top of the cabinet. Through them milk flows from the cow, over the cooler, into individual scale suspended compartments. A vaporproof light inside the cabinet makes it easy to read the scales quickly. After weight is recorded and sample taken, a valve is opened which allows milk to flow into the holding tank at the bottom of the cabinet. The entire unit replaces the milker pail and becomes the holding tank for the cold milk. It is mounted on wheels, and, when full, is simply rolled into the milk room for emptying into 10 gallon cans or a receiver tank.

The scales also show the progress of milking if you are interested in the amount of milk coming from the cow the first, second or third minute. Accurate milk

Reprinted by permission from Electricity on the Farm
New York City

samples are taken by lowering a stainless steel tube through an air lock. The milk is agitated by air if necessary and the sample lifted without interrupting operation of the unit. The DHIA tester remarked, "The simplicity, accuracy and cleanliness of taking samples is excellent."

Mr. Roop's procedure during milking saves many steps. He has a four stall milking parlor, the gates of which are operated by push buttons. The first stall, as cows come in, is used for preparation. The other three stalls are used for milking. Hot water, preparation towels, and the strip cup are used at the first stall. Preparation takes place while three cows are milking.

As a cow finishes milking, she is stripped with the machine. The teat cups are removed and dropped into a sterilizing solution. At that time one button, on the stall rail, is pushed, opening the front gate. Another button opens the rear gate. A third button opens the front gate of the preparation stall. The milked cow leaves, the prepared cow comes forward. Teat cups are put on, the stall gates are pulled closed, all without taking a step.

When the tank is full, the unit is rolled to the milk room and the milk run into 10 gallon cans. Part of the milk room is on milking parlor level. The cold milk flows by gravity into the cans at a lower level. Filled cans are placed in the cooler tank for storage. When milking is completed the entire milking unit is rolled to the sink and cleaned.

The catches on the gates of the milking parlor stalls are fitted with electric releases. The preparation stall has two push buttons, but the other three stalls have three. There is one for each gate and one for the front gate of the preparation stall. The gates are slightly off balance to swing open, but they are started open by a spring as the electric catch is released by the push button. The gates are closed by a hand pull. Grain is fed by hand from one point convenient to the three stalls.

The whole operation is quite simple, with no heavy work.

Every phase of milk handling is brought together in one compact unit. Milk never comes in contact with milking parlor air during the operation. Bacteria counts taken at random and over an extended period of time have averaged about 4,000 per c.c. Reasonably fast milking is practiced. There is sufficient time for proper before milking preparation and a small amount of time elapsing between preparation and the time the cow comes forward to the milking stall. With one person doing all the work, 25 cows per hour can be handled with ease.

Vegetable Growing — an Exciting Business

Condensed From American Agriculturist

Jim Hall

IF YOU are skilled enough in vegetable growing to have produce on the market a month ahead of the neighborhood backyard gardeners, then you might be a success in the commercial vegetable growing business.

I say "might" because you must be a bit of a philosopher, a bit of a gambler, and have the nerve to plow under an unsatisfactory crop after you've put your work and hundreds of dollars in it! To be a little more certain of success, you also need to have better than average knowledge of science, engineering and economics.

I learned plenty when I called recently on the Hafner brothers, Paul and Fred, near Baldwinsville in Onondaga county, New York. I called there to find out how in the world they had squash in Syracuse stores on June 5 when mine weren't even blossoming.

These two men—both are under 30—gained a lot of knowledge from their dad, but they are also quick to try new ideas and methods on their 100 acres of fresh market vegetables. Let them read about something in a farm paper that promises better quality, faster growth or heavier yield and they are right after county agent Jim Foster or Cornell university specialists to find out how they can best try it on their farm.

There are several reasons why these men and other professional vegetable growers reach the markets early with crisp, fresh, obviously top quality produce while prices are still profitable. The Hafners didn't list any one practice ahead of another for successful vegetable growing, but they did put a little more emphasis on three things: Painstaking seedbed preparation, irrigation and chemicals.

For disease and insect control, the Hafners use DDT, Marlate, parathion, rotenone, Parzate, chlordane, Zerlate and copper dust. They were especialy enthusiastic about results with chlordane in controlling grubs, wireworms and cutworms.

They claim that two things

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Ithaca, New York

help keep their weed troubles down without using chemical weed killers except in their hedge rows: (1) Their seedbeds are worked over and over and over before they set out plants; and (2) they make sure that no weeds go along with the plants from their greenhouses to the field. Each year they seed 10 to 15 acres of their 115 acre farm to clover in rye, combine the rye and then plow the patch under the next spring.

Most of their plants are started in their two greenhouses (32x70 feet and 18x100 feet), where the soil is steam sterilized to give the seedlings the best possible start and assure a quick catch when the plants are set outside in the extra well prepared seedbeds. To further speed up early marketing, the brothers use thousands of hot caps at 3c each—even on summer squash.

Some growers thought the Hafner boys a little rash in using hot caps on squash and paying for all the extra labor involved putting them on—and it was expensive—but they did all right. They had been selling half bushel hampers at $2.50 for three weeks when I called. They'll go on picking them until fall.

Their crops include asparagus, all different kinds of squash, early and late cauliflower (15 acres of it!) cabbage, sweet corn, peppers, egg plant, melons and a four acre patch of strawberries. Everything is irrigated with a portable system set up so as to put one and a half inches of water on the whole 100 acres in a week. With a war surplus engine and pump they can draw 1,000 gallons a minute through 1,000 feet of six inch aluminum pipe and from this main line 5,000 more feet of three and four inch pipe carries water wherever they want it on the farm.

This water (they have a limitless supply in the Seneca river) is their crop insurance. Fred told me that even in wet 1951 there were several occasions when having the water available just when they needed it saved the quality of crops. "This is especially true of cauliflower," Fred said.

To get the most from their good soil and water, Paul and Fred use plenty of fertilizer—a ton to the acre when they use 5-10-10 or a half ton of 8-16-16. They watch things closely. Paul told me 3-12-6 fertilizer was best for early tomatoes but for the later ones they get much better color and firmness using a 4-8-12. He explained that the amount of potash made a whale of a difference in the fruit.

Like many growers in the Onondaga county area, the Hafners don't worry about help to harvest strawberries. They just advertise, "Come Pick Your Own at 15c a Quart" and people flock

to the well irrigated patch. Paul said, "It's funny but while some people pick just the biggest berries, others pick everything in sight—even stuff that we would not think of putting on the market."

James Ford, chairman of the Onondaga Farm Bureau Vegetable Committee, has 40 acres of vegetables and berries not far from the Hafner brothers. Jim has the oscillating perforated pipe for his five acres of berries and four inch portable aluminum pipe for his cauliflower. Jim actually buys his water from the village of Baldwinville at about 19c for 1,000 cubic feet but he says it pays in these two crops. It isn't as expensive as it seems because he just opens a valve into the city water line and gets 85 pounds pressure without even owning an engine and pump!

Jim's well pleased with the new weed killers. His sweet corn, for instance, gets .4 pound of 2,4-D to the acre when it's 12 to 14 inches high and he gets marvelous weed control. A custom man applies it with a high pressure, low gallonage outfit. "The stuff warps the corn a little and it looks sick for a while," Jim told me, "but that's only temporary—it doesn't hurt the yield a bit. But it gets the weeds without a lot of labor."

Last year Jim experimented in a small part of his strawberries with the new Crag Herbicide 1. He was so well satisfied with the job of weed control it gave him that he'll use the spray on a much larger area this year.

Jim, like most of the vegetable men, makes full use of modern chemicals for disease and insect control—his power duster is on the go from the time the first plants break through the ground. He also follows recommendations of the extension service. When county agent Jim Foster tells him it's time to go after corn borers, his sweet corn gets 40 pounds of DDT to the acre, applied four times at five day intervals. He's well pleased with the control he gets.

Vegetable men are an inventive lot. When you see a new piece of equipment for any one of the hundreds of jobs to do on a vegetable farm, you can be pretty sure that it originated in the mind of a farmer. A harvesting packing gadget for broccoli looks like a brand new idea to me. Charlie Stratton of Hollis, New Hampshire, brought it to my attention. Veg-Acres Farms at Forrestdale, Massachusetts, where the traveling packing plant is used, is reputed to be the largest broccoli farm in New England.

The portable plant is built on a low bed trailer and, except for lunch time, is under motion from morning to night. A 40 foot boom with an endless conveyor belt sticks out the side of this plant

to bring to the trailer the croccoli being cut by 12 pickers. In the trailer plant is a crew of nine men. They bunch the broccoli, tie it by electric machine, wrap it with the Veg-Acre Farms brand name, and pack it in crates. At noon and night trucks haul the loaded crates to a shed for an ice water bath to remove field heat before the broccoli heads for market.

William Richards of Veg-Acre says the entire harvesting operation with the portable plant takes only 65 per cent as much help as with former methods.

Marketing is, of course, a mighty important part of the commercial vegetable business but once a man has the reputation of being on the market early with top quality produce he doesn't have too much worry—buyers will be at the farm with trucks, or retail store buyers will have the crop contracted.

Value of Soil Test Demonstrated

Many farmers are not sold on the value of soil testing but Edwin Sager, DeWitt county, Texas, is. Last spring Sager visited his county agent seeking information as to the grade and amount of fertilizer he should use to insure a good crop of red top hay. The county agent suggested that a soil sample from the field be submitted for testing.

The suggestion was carried out but when the results of the analysis and the accompanying recommendations were returned to Sager, he remarked that he couldn't afford to use that much fertilizer under his hay crop. The recommendation was 400 pounds of 10-10-0 fertilizer be applied per acre.

There were good reasons for questioning the recommendation, says the county agent. The land had been in cultivation for many years and was a poor lime rock soil. The best corn yield that could be expected from it was about 20 bushels per acre and conditions had to be right to get such a yield. The doubts thus were justified.

After further discussion, Sager followed the recommendation. In July, he cut and baled 1,073 bales of excellent red top hay from the eight acres. That figures 134 bales per acre and at market value the crop was worth $167.50 per acre. The cost of seed—and he seeded heavily—and fertilizer was $22 per acre and labor for planting and baling pushed this to $59.58. A little simple arithmetic shows a net income per acre of $107.92.

Sager concludes the dollar he spent for the soil test was the best investment he had ever made.

FARMER'S DIGEST LEGAL QUIZ BOX

You Be the Judge —

HOW WOULD YOU DECIDE?

Prepared by J. H. Beuscher, Professor of Law at the University of Wisconsin, author of FARM LAW IN WISCONSIN, available from C. C. Nelson Publishing Co., Appleton, Wisconsin, $4.00 postpaid.

Here Is the Problem:

Andrew and Peter Brown, brothers, each owned a half interest in a farm inherited from their father. They married Anna and Bertha Schulz, sisters. After marrying, Andrew and Peter made out and signed a deed naming all four, Anna, Bertha, Andrew and Peter, as "joint tenants and not as tenants in common." Both couples are living on the farm and both now have children. They feel that the joint tenancy (joint deed) method of owning the land is a good one for them, because, they say, it will save probate costs and death taxes when one or more of the owners dies. Is this correct? How do you rule?

Answer:

This arrangement is a most unfortunate one. The rule for joint tenancy (owning under joint deed) is, ". . . the survivor takes all." This joint tenancy can be likened to the hands of the various owners holding a stick. When one hand drops away in death, the remaining hands have the whole stick. In other words, if one couple, Anna and Andrew, dies first, their children will be disinherited; the farm will go to the surviving couple, Bertha and Peter. The last surviving owner will own the entire farm and when he dies, the farm will go to his heirs, or as he directs in his will.

Had they arranged each to own a fourth interest in the farm as "tenants in common" the result on the death of any one of them would be quite different. The one-fourth interest would pass on the death of its owner to his heirs, not to the surviving owners.

This case is a sad illustration of what happens when people plan property arrangements solely on the basis of trying to save probate costs and taxes, ignoring important family consequences. Incidentally, so far as probate costs go, it is true that a full dress

estate proceedings is usually not necessary for joint tenancy property. It is merely necessary through a simple procedure to show the name of the surviving owner or owners in the public records. But most people do not have all their property in joint tenancy, there is usually some property owned by the individual alone, and this will require a probate proceeding.

That there will be any substantial tax saving is doubtful. We leave federal estate and gift taxes, applicable to very sizeable transfers, out of the picture. Just looking at state death tax laws we find that most states tax the transfer to the surviving joint owner or owners. Usually the measure is one-half the value in case of two joint owners, one-third in case of three, one-fourth in case of four, etc. In our case a tax on one-fourth the value of the farm will probably be owing when each of the first three owners dies. Then, on death of the fourth, the last survivor, the full value will be taxed.

What should these people do to unsnarl this joint tenancy tangle? Will a simple will by each directing that his children are to take his "share" do it? The answer is clearly, "No." Survivorship rights arise before the will has a chance to operate. Probably the best thing to do is for all four to join in a deed transferring a fourth interest to each person as a "tenant in common."

Outlook Favorable for Livestock Feeders

Livestock feeders should fare better during the 1952-'53 feeding year than they did during the one just closing. S. Avery Bice, agricultural economist for the Colorado A. & M. extension service, says the sharp decline in cattle and lamb prices which hit feeder operators last year is shifting its burden to range operators this year. This widespread decline means that feeder operators can buy animals at considerably lower prices than they had to pay a year ago.

Present demand outlook indicates that prices for fed cattle should hold up fairly well in 1953 in spite of prospects for some increase in total numbers of animals to be fed. If this estimate of the situation proves out, a reasonable profit margin on fattened stock should exist, he said.

The immediate prospects on prices to be paid for choice feeders and calves is steady to strong, while common grades may decline somewhat to a low for the year sometime during October or early November.

Tractor Tire Tests

Wide Rims Don't Help Traction, Low Pressure Does, and Tread Effect Varies

Condensed From Agricultural Engineering

E. G. McKibben, I. F. Reed and C. A. Reaves, USDA

WHEN your Model T got stuck in sand, and you pulled out by letting most of the air out of the tires, you established a principle now confirmed in precise percentages at the most pretentious plant of its kind in all the world — the Tillage Machinery Laboratory of the USDA Division of Farm Machinery at Auburn, Alabama. It was one of the things learned in a study of several factors believed to influence tractor tire performance.

It seems that many tractor owners have been putting their tires on rims considerably wider than specified as standard by the tire industry. The tests were made with the 14-26 size of tire, which is supposed to be used on a standard rim 13 inches wide. Rim widths tested were 12, 14, 16 and 18 inches. Two types of tread were tested—the bar type, with deep diagonal cleats in a staggered chevron pattern, and the button type with diamond shaped knobs separated by diagonal grooves.

Four types of footing were used—dry Lakeland sand, Hiwassee sandy loam, Decatur clay loam, and medium rough finished concrete. Most amazing is the finding that, at any combination of footing, tire loading, and inflation pressure, the width of rim had no significant effect on the drawbar pull attainable or the work efficiency with which axle power was converted to drawbar power. In the charted curves of results, the tiny circles identifying the four widths of rim were so close together that they usually overlapped.

In one way, however, the wide base rims give an illusion of producing more drawbar pull. They make room for more water inside

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St. Joseph, Michigan

the tire, when water ballast is used. With 18 inch rims a pair of 14-26 tires hold some 240 pounds more water than with 12 inch rims—sufficient to support at least 100 pounds additional drawbar pull. Any other kind of weighting gives the same increase, regardless of rim width.

Most of us who are motorists take an open and shut view of tire slippage—we think the tire slips or does not slip. Tractor tires pulling loads in field soils always slip, and the per cent of slip is important. (The engineers call it "travel reduction" to include some minor effects not strictly slippage.) Work efficiency is the amount of energy the tire puts out as tractive pull, compared with the energy put in as axle torque.

Tested on the rather rough concrete, these tractor tires when worked to a point of 25 per cent travel reduction (let's call it slippage) produced a pull about 75 per cent as much as the effective weight of tire on paving. The highest work efficiency was a bit over 90 per cent, and it came with slippage of 5 to 10 per cent, where the pull was 38 to 64 per cent of weight. Beyond 25 per cent slippage, concrete was too tough on the tires for the slight gain in pull that might be possible.

In field soils the slippage was pushed up to 75 per cent—four turns of the tire to advance one turn. At this point, in the clay loam, the drawbar pull was still increasing, being already about 80 per cent of the weight. In the sandy loam, 75 per cent slippage produced pull 64 per cent of weight.

The Lakeland sand was 89 per cent pure sand, only 9 per cent clay, 2 per cent silt. In it, 75 per cent slippage produced pull only 40 per cent of the effective weight, little more than the 35 per cent pull at 25 per cent slippage. All the foregoing results were with bar type tires inflated to the standard pressure of 12 pounds per square inch.

In this sand, button type tires behaved differently. At 25 per cent slippage they produced the same pull as the bar type—about 35 per cent of weight. But instead of gaining pull with increased slippage, they lost traction until at 75 per cent slippage their pull was only 24 per cent of weight.

Here is where the reduced pressure helped. Dropping the inflation to eight pounds brought the pull up to 41 per cent at 25 per cent slip, and 36 per cent pull at 75 per cent slip. It means as much pull at 25 per cent slip as the bar type tires produced at 12 pounds inflation and 75 per cent slip. However, at eight pounds inflation the pull obtainable caused severe wrinkling of the sidewall.

It remains a question how much service a tire will endure—or can be built to endure—under these conditions. Wrinkling was less on the wide rims, and this may be their point of merit.

In all three types of soil, the bar type tires gave their highest work efficiency at about 15 per cent slippage, ranging from about 65 per cent in clay loam to 56 per cent in the sand. The button type tires had work efficiency of 60 per cent in sand at about 12 per cent slip.

While less efficient at moderate pull and slight slip, the bar type tires were able to produce a greater maximum pull, with high slippage, than the button type, in sand. But also, once the tractor stalled (100 per cent slip) the bar type tires dug in much faster. In tests where the button type dug down less than five inches in a half turn, the bar type went down about eight and a half inches. Both types went down a trifle faster with rims wider than standard.

If you are familiar with the capricious variations in soil composition and condition, you may wonder how comparable figures could be secured with such precision. At the Auburn laboratory, big bins are filled with sample soils mixed to uniformity, closely covered between tests to maintain moisture content, and worked to any desired condition at uniform depth. This is done with tools supported from a carriage extending full width of the bin and running on rails at its sides. The instrumentation is very elaborate, of course.

Pregnancy Test for Dairy Cows

We may have a quick and easy test that will tell a dairyman whether a cow is pregnant within a week after breeding. John H. Byers, Oregon State college, reports promising results with a new test adapted from a pregnancy check for humans developed by a German scientist.

The Byers test involves a chemical which produces a color change in urine when a cow is pregnant. A simple test which a farmer could do in his own barn, it has been 91 per cent accurate in limited experiments.

If the test proves valid it could become an important money and time saver for dairymen, saving valuable weeks in the breeding process. Byers says that about 10 per cent of the cows in most herds have trouble conceiving. Such animals lose an average of 60 days each in becoming pregnant. In a 100 cow herd this means 600 lost days, or two complete lactations plus two calves. *Capper's Farmer*

Some Things to Remember When You Examine Your

Farm Operations . . .

WHAT MAKES GOOD INCOMES ON DAIRY FARMS?

Condensed From Pennsylvania Farmer

A. A. Borland

FARMERS' incomes are greatly affected by the general price level and by the way they manage their farms, according to a new bulletin published by the Vermont Agricultural Experiment Station.

The farm businesses of 223 dairymen were studied to find out why some dairymen make much better incomes than others.

Good cows were found to be a prime essential for a high labor income. Farmers whose cows yielded less than 5,000 pounds of milk per year lost money. On the other hand, farmers with cows producing over 5,000 pounds of milks per year had positive labor incomes.

Labor efficiency affected the cash returns of Vermont dairymen more than any other single factor. The amount of productive work done per man on the farm is probably the best way to determine how efficiently labor is used. A productive man - work unit represents the expected accomplishment of an able bodied man engaged in income producing work in the course of a 10 hour day.

As the work units per man increased, labor incomes increased. Labor incomes averaged $2,744 higher on farms where there were over 400 work units per man than on those where there were 175 or less. Part of the difference is due to the increase in size of farm which causes a rise in the number of work units per man.

Some of the dairy farmers studied found it easier to measure labor efficiency by the number of cows cared for per man. Labor incomes increased as more cows

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Pittsburgh, Pennsylvania

were handled per man. The 57 farmers who averaged only seven cows per man had labor incomes averaging $2,457 less than the farms where 19 or more cows per man were kept.

Size of farm also accounted for great differences in returns. Large farms pay better than small ones because the operator can use labor and equipment to better advantage.

Nearly as much equipment is needed to run a small farm as a large one. Men with small farms are not able to use machinery to as full capacity as men with larger farms yet their taxes, insurance, depreciations and other fixed expenses are nearly as high.

Contrary to the opinion of some people, there was no relation between cows per farm and milk production per cow. Milk production per cow remained nearly constant as size of farm increased. However, labor incomes increased proportionately with size of farm. On the large farms, the operators had the highest labor incomes, averaging $1,049 per year. On these farms more cows were cared for per man and labor was used more efficiently. On the farms with over 640 work units, the highest labor incomes prevailed. These farms had an average of over 100 acres of crop land, more than 30 cows per farm and over 300 work units per man. Many dairy farmers do not keep enough cows. A few more cows, provided that feed and space were available, would help some of these farmers increase their income.

There was a greater difference in range of yield per acre among farmers within an area than among the several areas studied. An acre of land on one farm sometimes has twice or three times the production of an acre of land across the fence on the neighbor's farm. On many farms, crop yields could be greatly increased with the use of more fertilizer.

The number of acres of crop land on a farm is not a good measure of size. The number of cows for which this crop land will provide feed is a better indicator. Generally we can expect an increase in labor income as acres of crop land per farm increase, provided more cows are kept.

The advantage of even milk production throughout the year shows up by the better labor incomes for those farmers who produced about half of their milk during the six fall and winter months. These farmers were able to use their labor more efficiently. The farmers who have their milk production respond to seasonable price differentials usually benefit by getting larger labor incomes.

A proper investment pays. Farmers who have too large an investment per cow in buildings

and equipment are handicapped by heavy expenses for taxes, insurance, upkeep and interest. It was found that a farmer with 20 cows needed practically the same equipment as a farmer with 30 cows. Experts recommend that farmers buy such equipment as tractors, mechanical gutter cleaners and field choppers only if they have sufficient work so that these machines will pay for themselves. The object is to use power and machinery for work that was formerly done with horses or by hand in hopes that costs will be lowered or more work done.

On the farms studied it was found that as the investment per cow increased, labor incomes generally decreased. The farmers with an investment of $700 or less per cow made the highest labor incomes. A low investment per cow should not be achieved by poor cows and a lack of machinery.

The best measure of efficiency on dairy farms is the amount of milk sold per man. This measure includes labor efficiency, size and production per cow. As the amount of milk sold per man increased from 15 tons to 70 tons, labor incomes increased from minus $588 to $2,768. It is generally more difficult to achieve both high production per cow and a large number of cows per man than it is to reach either goal alone. But farmers who do achieve both and thereby produce a large amount of milk per man are assured of a much larger income.

Farmers who had above average production per cow, labor efficiency and size of farm had a labor income of $2,148. At the other extreme, the farms that were below average in these factors had average labor incomes of minus $378.

A dairy farmer who wishes to increase his income should make a careful study of the organization of his farm, locate the present weaknesses and strive to correct them.

Investment per person engaged in agriculture is higher than for the person employed in industry and a farmer operates more mechanical horsepower in his average farming operations than the city dweller does at his job.

For maintenance of stand, yield of hay and production of protein, a good time to cut alfalfa is in early bloom stage when new shoots are started around the base of the plants, but are not high enough to be cut with the mower, says Charles C. Ellwood, University of Arizona agronomist.

What Chemical Spraying of a Costly Range Robber

Has Meant to One Texas Ranch

McGregor vs. Mesquite

Condensed From The Hereford Journal

W. S. Jackson, Jr.

THE mesquite tree is getting its just deserts on rangelands of the southwest these days.

Charlie Fisher of Spur, Texas, has won his longtime fight against the pest. Through his work at the experiment station there, Fisher has shown ranchers how they can control mesquite with airplane applications of one of the new chemical weed killers—a low volatile ester of 2,4,5-T.

Last year, when more than a half million acres of brush land were sprayed, some astronomical figures were published to show what the killing of this mesquite acreage would mean in producing more pounds of beef, in saving time in the handling of cattle, and even in saving Levis, chaps and hide (both horse and man) from the ripping scratches of mesquite thorns. But, impressive as these figures are, they're like reading items in the national budget—too many zeros for the average ranch operator to apply to his own operation.

So, let's look briefly at the experience of just one rancher—Carter McGregor, jr., who operates the McGregor Hereford Ranch at Wichita Falls, Texas.

This is not a registered cattle operation. The McGregor spread carries top quality commercial Herefords—cattle sired by registered bulls.

Last year over 1,500 acres of mesquite covered rangeland were sprayed on the McGregor ranch. In January of this year, Mr. McGregor examined the sprayed area and made a report on apparent results. It was too early, he said, to determine the exact percentage of root kill the chemical had achieved. Top kill looked like at least 90 per cent. Then he

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Kansas City, Missouri

went on to make a mouth watering sort of statement, in view of the Texas drouth which had plagued the area:

"However, one result that is apparent already is the growth of the native pasture grasses. In this area, we have had a very negligible amount of rainfall in the last six months, but the grasses in the pastures which have been sprayed are still in excellent condition compared to the grasses in the pastures where no spraying was done. There are no weeds in the sprayed area. . . . The cattle grazing on the sprayed area are in better flesh than the others, although they are receiving less concentrates and no roughage, while I am having to feed hay in my untreated pasture."

A couple of months later, I had occasion to visit the McGregor ranch. It took only a glance at sprayed and unsprayed areas to see the difference. Within 200 feet, along the border of the sprayed acreage, there was an increase in stand of from 50 to 100 per cent. Where the mesquite had not been killed, this pest was sucking up what little soil moisture existed. In addition, the live trees had leafed out and were shading out much of the grazing area. But, where the trees were dead, grasses were making good growth, considering the drouth conditions.

As the spring wore on, a few storms brought a little rain on the McGregor ranch, and this only helped emphasize the better grazing supplied where mesquite had been sprayed. In early June I had another visit with Mr. McGregor, and here's what he told me:

"The cows with calves at side which have been grazed on the pasture where we sprayed the mesquite have kept in much better condition than the ones on the unsprayed pasture. I can carry about a third more cattle on the sprayed acreage than on the same amount of unsprayed range. One thing this certainly points up is the particular advantage of mesquite spraying so far as small operators are concerned, those who depend on a limited acreage for beef production."

An additional 2,000 acres of mesquite covered range are slated for spraying this year on the McGregor ranch—part of more than a million acres due for spraying this year in the southwest, according to early estimates. The same conditions of improved feed, higher carrying capacity and better condition of cattle which were so apparent on McGregor Hereford Ranch have been noted by many other cattlemen who sprayed part of their mesquite trees last year.

Over the long haul, these advantages are even more pronounced. At the Spur experiment station, Charlie Fisher has been

keeping weight records on seasonal gains made by steers on sprayed and unsprayed areas over the past six years. Here's the way he sums up these studies:

"Over a six year period, steers on cleared pastures have gained an average of 31 pounds more than those on brush pastures. In 1948, a very dry year, the steers on cleared pastures gained 42 per cent more than those on brush pastures. During the last three years, the steers on cleared pastures have gained 29 per cent more."

Directions for treating mesquite have been worked down to a definite pattern, thanks to Mr. Fisher's persistent experiments over the years. Here they are in brief:

DOSAGE—Minimum of two-thirds of a pound of 2,4,5-T acid equivalent as a low volatile ester per acre. Apply in four gallons of a 25 per cent oil emulsion.

MIXING—One and a third pints of 2,4,5-T low volatile ester in a gallon of No. 2 diesel oil and three gallons of water. Soft water is best. Approved 2,4,5-T formulations have enough emulsifier to properly mix the oil and water. Mixing the chemical in batches to suit the capacity of the spray tank in the plane applying the material provides more accurate application.

APPLICATION — Flagmen should be stationed at the boundaries of areas to be treated, so the pilot can gauge his coverage. Large spray droplets give most efficient control, cutting down on drift of the material and giving more uniform distribution. Gravity flow, low pressure systems do the best spray job. Large nozzles should be employed, having openings from a quarter to three-eighths of an inch, with positive cut-offs.

TIMING — Spray when mesquite has reached its full leaf stage and when there is ample soil moisture to assure rapid growth. This is usually from 40 to 90 days after leaves first appear.

COST — Flying service fees vary, but should run in the neighborhood of $3.50 per acre. This includes chemical, air application, ground crew and equipment, and diesel oil. The rancher furnishes the necessary flagmen.

CAUTION — In amounts required for mesquite spraying, 2,4,5-T is not toxic to livestock or damaging to grasses. However, serious damage can be caused if the material drifts onto such susceptible crops as cotton, alfalfa, clover, tomatoes and others.

Ranchers in the mesquite country are becoming enthused over this spraying program, because no other comparable investment seems to offer so many advantages—more beef per acre, more cattle, more easily located at roundup time, and more hide per cowhand after a day riding.

What's New in Poultry Feeding?

Condensed From American Poultry Journal

L. E. Card

POULTRY research workers and practical poultrymen have long been in the habit of operating on the nutritional front lines.

Let's take a look at their findings of the past four or five years to see how far we have come and perhaps to discover a clue to where we are going. With feed costs high in relation to the selling price of the product, it is especially important to convert each ton of feed into the largest possible number of eggs or pounds of poultry meat.

Remarkable gains in feed conversion by broilers have been made in the past five years. Instead of three pound broilers in 12 or 13 weeks from 13 pounds of feed, many commercial growers are getting three pound average weights in 10 weeks or less on no more than nine and one-half pounds of feed. Some are doing it in nine weeks on nine pounds of feed.

How was this possible? Two things were necessary—a type of chicken which could grow rapidly to 10 weeks of age, and a type of ration which would permit efficient feed conversion. Poultry breeders produced the kind of chicken needed, and research workers found the answer to feed conversion.

Requirements for rapid growth were worked out one at a time until we knew about how much protein, calcium, phosphorus, manganese, vitamin A, vitamin D, riboflavin and choline to add to the feed. Then in 1947, workers at the Connecticut (Storrs) Station found out that many common rations, especially if built around corn, contained too little niacin (nicotinic acid) for maximum growth and feed conversion. Niacin additions paved the way for greater use of corn and a consequent increase in the amount of energy in each pound of ration. Since energy is the nutrient re-

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quired in largest amount, this change in formulation was of great significance. The research on which it was based has paid off handsomely and will continue to do so for the foreseeable future.

Antibiotics in Common Use

Another valuable finding was the identification and isolation of vitamin B-12. Because it occurs in such products as fish meal and meat scrap, but in only trace amounts in plant protein concentrates, it was first referred to as APF or the animal protein factor. Only a small amount is needed—so small that it can be measured as a few parts per million in the total feed, but this small amount is essential for normal growth and hatchability.

Vitamin B-12 is present in fermentation residues from the commercial production of antibiotics, and the use of these residues as sources of B-12 led to the discovery of a growth response from the antibiotics themselves. The reason for the response is not known, but as little as one-third ounce in a ton of feed is sufficient to cause a marked increase in growth of young chicks during the first few weeks after hatching. The antibiotics in common use include aureomycin, bacitracin, penicillin and terramycin. Others are being tested in several laboratories, and new ones may prove to be equally effective.

If chicks are started on a ration containing an antibiotic, they should be continued on that ration throughout their period of rapid growth in order to obtain the maximum benefit from the antibiotic. A decrease in gains is likely to result if the antibiotic is discontinued at the end of four, five or six weeks. There is no evidence to indicate that antibiotics are of nutritional value in the rations of any but young growing animals. Research on the use of antibiotics in rations of laying hens is being carried on by different investigators.

Another new development in poultry nutrition is the emphasis being given to the protein requirement in terms of the amino acids of which the various proteins are composed. Of the 20 or more amino acids known to be important in nutrition, at least 17 have been found in whole egg protein, and nearly as many in chicken muscle. Chicken muscle contains significantly more lysine, but less cystine and methionine than does egg protein.

Cystine and methionine, incidentally, are the two which contain sulphur, and most people know that there is sulphur in egg yolks. It has been assumed for years that chickens, as well as other animals, got all of their sulphur containing amino acids by eating proteins which already contained them, but USDA scientists have recently traced radio-

active sulphur right to the protein in eggs laid by hens injected with dilute sulphuric acid.

Some of the amino acids must be furnished in the feed because the chicken is unable to make them in adequate amounts from other protein. We now know that five of the amino acids are critical, in the sense that careful attention must be paid to them in formulating successful chick rations. These are arginine, cystine, lysine, methionine and tryptophane. As the result of recent research, we even know the minimum percentages which must be supplied in a ration if rapid growth is to occur. These vary from one per cent for arginine to as little as 0.2 per cent for tryptophane, when the total protein content of the ration is 20 per cent.

Amino Acids Are Important

Availability of amino acids for use by the chicken can be greatly affected by heat, which means that soybean processors, for example, must control time and temperature carefully to insure a high quality of soybean meal. Some cooking of the raw beans is necessary, but overheating must be avoided. In tests with meal heated to 120 degrees centigrade (about 250 degrees Fahrenheit) for four hours, chicks gained only one-third as much in a seven day period as when fed a meal heated to the same temperature for only four minutes. Addition of lysine and methionine to the ration containing the overheated meal corrected the difficulty.

Amino acids are important in other ways than building egg protein and muscle tissue. They are necessary for the formation of certain hormones and of hemoglobin in the blood. Furthermore, full utilization of some of them is dependent upon the presence of adequate amounts of certain B vitamins and minerals. Still other interesting and intricate relationships are being discovered as scientists find new ways of observing what goes on inside the chicken.

These examples show clearly that research is important in advancing the poultry industry, but they also show that different groups in the industry are becoming more and more dependent on each other for the success of all. With research workers continuing to discover new facts, and with feed manufacturers ready and willing to apply these facts in the formulation of better feeds, even more striking developments may be just ahead.

Average United States dollar spent for phosphate fertilizer returns more than four dollars to the farmer, according to the USDA.

Electrons Ride on Bug Dust

To Make Pesticides Land Better, Stick Tighter, Go Twice as Far

Condensed From Agricultural Engineering

IT IS EASY to blow a cloud of dust at a bush or a field of beans, but not so easy to make it cover both sides of the leaves, or even to make it stick on one side. As a result, most of the costly material used in crop dusting is wasted, and even a heavy application may be poorly distributed.

The same mysterious force which sometimes draws a wisp of dry hair to a comb and causes it to cling thereto has been put to work to multiply the effectiveness of poison dusts, and the method may be extended to other materials applied in the form of dust. Early results were reported at the last winter meeting of the American Society of Agricultural Engineers by Henry Bowen, Peter Hebblethwaite and W. M. Carleton.

The trick is to put a strong electrostatic charge on all or most of the dust particles, so that when they get close to the surface of a plant leaf they will be pulled into contact with it rather firmly. The blast of air carrying the dust cloud is blown through a straight round tube just ahead of the distribution nozzle. In the center of the tube, like the lead in a pencil, is a slender electrode supported by a suitable insulator. The electrode is supplied with a high negative voltage, sufficient to make it give off the violet glow known as corona. In this corona, neutral air molecules are converted by electron collision into plus and minus air ions.

The plus ions are drawn to the electrode and neutralized. The minus ions are pushed swiftly toward the grounded metal shell of the tube. On their way they "load up" dust particles with strong negative charges. The dust must be kept moving fast enough to prevent it from being deposited on the wall of the tube.

The charged particles behave like any other windborne dust until they come close to a leaf or other surface, and it is here that

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St. Joseph, Michigan

they need help. When the air blast is checked as it pushes toward the surface, the particles have only their feeble momentum to drive on through the final film of air. Also, there often is a strange effect known as surface repulsion which tends to push the particles back. In these close quarters, the electrostatic force comes into action and slaps the dust against the leaf.

The voltage used at the electrode must be high enough to produce a corona, but not so high as to jump an arc to the surrounding tube. In the nozzles used, this means anywhere from 5,000 or 6,000 volts up to 14,000 volts. The current that flows in forming the corona is fantastically small, measured in millionths of an ampere. Electric power, suitably stepped up, is drawn from an ordinary automobile battery, or the same sort of battery as used on many tractors.

In the field tests the voltage used was 12,000 and the current was one-tenth of a milliampere for each nozzle. This probably was too much current for the best results, as later laboratory study revealed that the optimum current varied with different kinds of dusts, and to some extent with atmospheric conditions. Patient testing and precise measurements will reveal the correct current for various materials and conditions.

Field tests were made with potatoes, peas, onions, celery, beans and clover. The bugs were not very obliging about showing up to attack, except on the potatoes and onions. Here there was definitely better protection, resulting in significantly higher yields, on plots where charged dust was used. On all crops it could be seen that the charged dust provided more complete and uniform coverage.

An example of this was the use of the same amounts of lead arsenate on beans. Actual measurement showed that uncharged dust was caught and retained to the extent of about 10 per cent, while the charged dust was nearly 24 per cent deposited. This is typical of observations leading to the opinion that the amount of dust needed is reduced at least 50 per cent by charging. Besides this obvious economy, electrostatic dusting promises to do away with the need for night dusting in order to get good deposits, also to diminish the drifting away of dust in windy conditions.

While the more-or-less makeshift experimental equipment worked well, much development remains to be done, such as improved insulators for the mounting of electrodes in nozzles. The high voltage generator must be made shockproof and more nearly foolproof. Much more needs to be learned of the best amperages to be used. The size of particles, or how fine the dust should be,

may be quite different from what is now prevailing practice.

Until commercial designs are worked out, nobody knows how much it will cost to add charging equipment to dusters. It may be something like $300. Routine dusting of sundry field crops seems to be gaining in extent, and may gain impetus from the enhanced effectiveness and economy of the electrostatic method. Thus it might make a worth while market for the makers of electronic components.

Tractor - Mounted Gutter Cleaner

A homemade gutter cleaner is saving some New York dairymen a great deal of time and hard work. The cleaner is simply a barn gutter scraper mounted on a tractor. The cleaner can be made in the farm workshop or in a welding shop.

Early in 1949, Walter Culver, jr., dairyman near Amenia, New York, started thinking about how he could do the chores more easily in his 100 cow dairy barn. First, he took measurements of the gutters in the barn. Then he bought some sheet iron and framework material and took them to a welding shop, where the scraper was built.

With the scraper, Culver's barn can be cleaned with the cows either in or out of the stanchions. Cleaning time is about 45 minutes for one man, including spreading the manure on a near-by field. Culver can load the spreader in five minutes. He takes the manure from 12 cows—six on a side—in one sweep with the scraper. At the ends of the gutters, the manure drops through holes into the spreader below.

The cost of the sheet iron for the scraper blade and the welding was only $30. The tractor hoist was $210. While the hoist can be used for other jobs, Culver charges the cost to the barn cleaner. The cleaner has now been in use three years.

In 1951, Jacob Hilperthauser, Millerton, New York, built a new 76 cow dairy barn and installed a similar cleaner. Hilperthauser took dimensions from Walter Culver's cleaner and had a welder construct the scraper to fit his tractor. The construction cost was $125 for the scraper blade and welding job.

Bernie Morrison, Millerton, New York, also has built a tractor-mounted scraper. He used the same idea as Culver but mounted the cleaner on the rear of his tractor. The hydraulic drawbar elevates the blade about two feet. Morrison's cleaner cost $125.

—Oren Burbank in Successful Farming

Raise Healthy Calves
THE ROUGHAGE WAY

Condensed From The Ohio Farmer

Delmer E. Groves

ARE YOU satisfied with your present system of raising calves? If not, you may want to try the "Ohio high-roughage system" of raising dairy replacements. Not only does it raise calves at low cost but it helps keep them healthy.

The system was developed in the dairy science department at the Ohio agricultural experiment station by J. W. Hibbs and W. D. Pounden. It is based on feeding large amounts of good hay and a limited amount of grain, coupled with cud inoculation of the calves. Inoculation is accomplished by placing bits of cud taken from the mouths of older animals into the mouths of the calves and allowing them to swallow it.

Every calf is born with four compartments to his stomach. The purpose of the Ohio high-roughage system is to get him started using all four of them, and particularly the first compartment or rumen, early in life. Cud inoculation places the necessary bacteria and protozoa in the rumen of the calf at an early age and a high intake of roughage allows the micro-organisms to flourish there.

The method is not intended to fatten calves so it doesn't work for vealers. All problems have not been solved and research continues. Here is an outline of how the system works as currently recommended.

Colostrum and whole milk. Be sure the calf gets plenty of colostrum or first milk. This contains the nutrients needed to give the calf a good start. After the first milking, take the calf away from the cow and hand feed colostrum to the calf twice daily for three days. Then feed whole milk at the rate of one pound (pint) of milk per 10 pounds of birthweight daily. Continue for six weeks and cut the amount of milk in half during the seventh week.

All the milk can be taken away after the seventh week in most

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Cleveland, Ohio

cases. Good judgment should always be used in taking calves off milk. The calf should be eating about one pound or more of hay per day before it is taken off milk entirely. If milk substitutes are used be sure they contain sufficient vitamin A.

Hay and grain. Offer good quality legume hay right from the start. A mixture of one-half to three-fourths bright green, leafy alfalfa and the remainder immature timothy is best. Offer more than the calf will clean up to give it some choice and change the hay each day.

Grain feeding at the rate of one-fourth pound daily can start as soon as the calf gets to eating about one-half pound of hay daily. The same ration fed the milking herd will work for calves. Keep the amount of grain regulated so that the calf never gets more than half as much grain by weight as hay eaten per day.

During the first few weeks, it may work best to grind or chop the hay coarsely using a three-fourths to one inch mesh screen. Mix the grain with the hay in the proportion of two parts hay to one part grain by weight and feed this mixture free choice. It's better to buy good hay than to try to make poor hay do, especially the first few months.

Based on station experience, feed Holstein calves a mixture of two parts coarsely ground hay to one part grain for the first five weeks.

Beginning at the sixth week, feed hay free choice and one-fourth pound of grain per day. Increase the amount of grain per day by one-fourth pound each week until the 25th week, when five pounds are being fed daily. The grain fed need not be increased beyond this amount but free-choice hay feeding should be continued.

The two-to-one mixture should be fed to Jerseys until the end of the eighth week, then feed one-fourth pound of grain per day each week until the 25th week, when about four pounds per day is being fed.

Then let hay consumption go on up and hold the grain constant, the same as for the Holsteins. Variations from this guide can be made depending on the condition of the calves. Grain can be fed as high as three parts hay to two parts grain without seriously impairing rumen function.

If diarrhea occurs the hay should be changed to one containing more early-cut grass in proportion to legume. Calves should always have free access to water, salt and bonemeal.

Cud inoculations. All calves should be treated weekly during the first six weeks. This is done by placing a small piece of fresh, warm cud material taken from a healthy cow in the back of the

calf's mouth.

Cuds for inoculating calves are obtained from cows while they are chewing. This is done by quietly approaching the cow chewing a fresh cud. Pass the left arm over her face and grasp her left upper lip with the left hand.

The fingers of the left hand are extended into the mouth and pressed against her palate, thus causing her to hold her mouth open. The right hand is then used to obtain some of the cud, a piece of which can usually be found alongside the tongue and premolar teeth.

Small pieces of the fresh, warm cud material are placed into the calves' mouths. A rubber covered forceps may be used to avoid getting the strong smell of cud on the hands.

A fresh cud should be obtained each time calves are to be inoculated. A pinch of cud contains billions of rumen micro-organisms which will become established in the calf's rumen if conditions are favorable.

How calves perform. On the average, calves raised according to this system grow at a rate equal to the Ragsdale standard for the respective breed. This means that 90 pound Holstein calves will average at least 355 pounds at six months of age. Jerseys born at 53 pounds will average 243 pounds at six months of age.

When whole milk is fed for seven weeks (one-half feed during the seventh week) Holstein calves will consume about 380 pounds and Jerseys about 260 pounds.

One group of experiment station Holsteins fed the two-to-one ratio of hay to grain ate 819 pounds of hay and 346 pounds of grain in the first six months. Their total cost for feed, including milk was $41.81. Milk was figured at $4.50 per 100 pounds, grain at $3 per hundred and hay at $35 per ton. Cost per pound of gain was 15c.

Several heifers have freshened which were started on the Ohio high-roughage system at the station. They are big, roomy cows, are producing well and have every indication of making profitable herd replacements.

United States air force depends on good grass covers to reduce dust between airport strips. This practice can actually prolong the life of an airplane engine by as much as 25 per cent.

It takes 10 per cent less power to farm on the contour than up and down hill, says the United States Department of Agriculture. So contour planting saves on machinery and fuel, as well as the all-important soil.

New System Builds Fertility and Keeps It

Condensed From Kansas Farmer

M. N. Beeler

SCIENTISTS have found a way to speed fertility build-up and insure upkeep. New know-how builds soil fertility in a hurry. That means better yields and better pay from crops. You no longer need to wait years for results. You no longer need tease a profitable yield out of a reluctant soil.

With this new system of soil fertility management, you can set any crop-yield goal within reason and just about make it. It's simple, sensible and as certain as anything in life. Easy to follow, too.

Here is the reasoning back of the new system as explained by Dr. R. H. Bray, Illinois College of Agriculture:

"Feed the soil and let it feed the crops." Make the land a self-feeder. Then plants can get from it the food they need in amounts they need and when they need it. They'll do a good job of balancing rations both in seasons of drouth and in seasons of plentiful moisture.

Soil fertility is the foundation of any profitable system of balanced farming. Balance between fertility outgo and input is the first requirement in maintaining such a system. None of the other balances can be effected or maintained without it.

Dr. Bray's recipe for profitable fertility is divided into two parts — buildup and upkeep. The build-up can be done in two ways —in a one-shot treatment in which all the lime and fertilizers are applied, or in several treatments spread over two or more rotations. The first method will require a big lump sum expenditure for poor land. But it also will pay off sooner, in the next crop after treatment. The second method spreads the cash outlay over several seasons, but also gives slower returns. Either procedure is much faster than the 20 years to a gen-

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Topeka, Kansas

eration required by previous processes. Which method you follow, says Dr. Bray, depends on your circumstances. In either case, the sooner you make the buildup, the sooner you can put your soil feeding on a maintenance basis.

Another top soil scientist, Dr. Emil Truog of Wisconsin, puts it this way: "Poor land is like a flat tire. The tire needs air pressure and the land needs fertility pressure. You don't inflate a tire by stages—a few pounds now, a few next week and some more later. Instead, you put in the right pressure at one filling. So why not put the right fertility pressure into a farm all at once?"

You don't guess when you're inflating a tire. You use a gauge. So you shouldn't guess in inflating a farm. Use a gauge—the county or staté soil testing laboratory.

Take samples, field by field. The laboratory or the county agent will supply directions. The best plan is to follow a definite sampling pattern that will cover the whole field. Then you'll be certain to spot the varying deficiencies. This is a little more trouble and a little more expensive than shotgun testing, but it will pay off by saving treatment materials. It's wasted money, for instance, to put three tons of limestone on a portion of a field that needs only two, or the other way around. The same holds true for other fertilizers.

The most common deficiencies will be limestone, organic matter, nitrogen, phosphorus and potassium. In some regions there will be shortages of the so-called trace or minor elements. Ask the county agent or the laboratory about the need for such treatments for your area. Simple tests for lime or calcium, phosphorus and potassium have long been available. More recently practical tests for organic matter have been worked out. And now, within the last few months, a nitrogen test has been announced from Wisconsin. It will tell a farmer how much of this plant food will be available for his crops the coming season. Then he can supply the deficiency at planting or cultivating time for row crops, or ahead of the big need for pasture or hay crops.

Report of the laboratory will put your land in one of three classes, according to the plant food found. Dr. Bray explains these classes:

1. Deficient in fertility. Less than 150 pounds of potash an acre. Low in nitrogen and organic matter, low to medium in phosphorus and a need for two to five tons of ground limestone. Most soils lack one or more of these plant foods and some are short of all. They must be built up before top yields can be ex-

pected.

2. About right in fertility. From 150 to 200 pounds of potash an acre, medium to high in organic matter, nitrogen and phosphorus, and needing one ton or less of limestone an acre. Such land will produce top yields but the outgo of phosphorus, potash, nitrogen, organic matter and lime removed by crops or lost by erosion must be balanced by input of these elements to keep the fertility balanced.

3. Long on fertility. More than 200 pounds of potash an acre, high in organic matter, nitrogen, phosphate and needs no lime. Not many soils are in this class. But they may be cropped without fertilizers until the extra fertility is used up. Treatments will be unnecessary expense until that is done. But retest should be made from time to time to make sure fertility does not drop below the profitable level.

Apply the kinds and amounts of plant food indicated by the laboratory report. If the quick buildup is selected, all the mineral treatments can be put on in one season. The organic matter will need to be built up by green manures, crop residues and animal manures and will require several years. After the quick buildup, the program can go on to a maintenance basis the next year. That means applying the plant food to balance what is taken out or lost. This can be done every year or once in a rotation.

If the slower buildup is selected, apply the needed lime. That will permit growing legumes. Then spread the other treatments over two or more rotations. But remember that more plant foods must be added than are removed, else there will be no buildup. If you put on only what is taken out each year, yields will hold at present levels. If you put on less than is removed, yields will decline. Extra plant food must be applied until fertility is built up to make the yields you want.

Adopt a crop rotation wherever possible. Feed organic matter and nitrogen into the soil by growing legumes, returning all manures, straw and other crop residues to the land. Don't be afraid to turn under green manure crops. And don't assume that alfalfa is the magic that you need. Alfalfa is an exhaustive crop, takes high toll of phosphorus and potash, when it is sold as hay. Further, it must get plant food to make top yields. Where a complete rotation is not practical, follow a comparable system —crop sequence and regular fallow.

On sloping land where soil treatment, cover crops and rotation are not enough to control erosion, establish protective measures. These include terraces, diversion works, contour farming,

grassed waterways, water-holding ponds, dams and gully repair. Put rough land into hay and pasture and utilize it with livestock.

The soil laboratory can be of greater service to you in later tests than in the first. It can tell you whether your buildup and upkeep program is doing the job. So retest from time to time— at least every six to eight years. That will check your fertility program, enable you to keep it in balance. When the fertility pressure is high enough for the yield goals you have set, whether in the quick or the slower buildup, you go on to the upkeep program. That means regular applications of plant food.

Don't make the mistake of assuming your land is good enough: A farm that has made somebody rich a generation ago is not necessarily a fertile farm today. The land your father farmed is not the same farm it was, even though the title reads the same. To make high yields, your soil must have what it takes to make such yields. Fertility must be built up in poor soils. It must be kept up in good soils. Either way you need added plant food. Either way you need to test.

Making a crop is like putting up a building. Certain materials are needed in either case. And there must be enough in the right proportions for the size job. You can't make a top yield out of the fertility for half a yield.

To grow 100 bushels of corn, for instance, the soil must deliver 150 pounds of nitrogen, 23 pounds of phophorus, 72 pounds of potassium, a generous amount of organic matter and five million pounds of water. Equivalent output of other crops are 70 bushels of oats, 35 of wheat, 32 of soybeans and three tons of legume hay. Acreage required for this delivery depends on what Dr. Truog calls fertility pressure. If that pressure is high, the output can be had from an acre. If the pressure is low, the output may require two or more acres.

Of all ingredients that go into a high yield, you as a farmer now lack control of only one—rainfall. Of course, no amount of plant food will prevent damage in severe drouth. On the other hand, no amount of rainfall will make a good crop on poor land. But a soil containing plenty of plant food has a better chance of making a paying crop under moisture shortage than a poor soil. That was amply proved in this year's wheat. Fertilized fields ripened days ahead of untreated fields, made good yields despite the June drouth. They also stood up better under disease and insect attacks.

Dr. Truog reports that tired old fields in Wisconsin were made to produce like Corn Belt land by soil treatments. Fertility pressure, built up in poor land by plant food, made alfalfa yield four tons

an acre in two cuttings, red clover three tons. Cost of treatment was $35 an acre, but the output repaid the cost two or three times over. Two other fields on the same farm and drouth made 34 bushels of wheat and 43 bushels of rye, respectively.

You no longer need to wish for good crop yields. You can have them by testing your soil and by putting the fertility pressure up to the level required. It's a program of buildup and then of upkeep.

Soybean Price Outlook

Soybeans are subject to more violent price fluctuations than any other commodity. These erratic price patterns are due to the heavy farmer marketings at harvest time and inability of processors to satisfactorily hedge cash purchases.

Thus, producers are interested in the seasonal price trend which is lowest during October and highest during April and May with most of the increase coming by January 1. Marketing according to this seasonal price pattern will enable the grower to sell beans at best advantage. For example, during the period November, 1950 to April, 1951 soybean prices rose $1.10 per bushel.

Soybean prices are determined by the yield of oil and meal from a bushel of beans. The average yield is eight and one-half pounds of oil and 48 pounds of meal. To determine the price of a bushel of soybeans thought must be given to the supply of and the demand for these two products.

Soybean meal is in demand because of the large number of livestock units being fed and the increased rate of feeding. Linseed and cottonseed meal supplies will be smaller than last year due to smaller flax and cotton crops. It is unlikely that market prices for soybean oil will advance very much because world supplies of fats and oils have regained prewar levels.

The present price ceiling on meal of $81 per ton basis Decatur, Illinois, makes the 48 pounds of meal from a bushel of beans worth $1.94. The eight and one-half pounds of oil from the bushel of soybeans at the present market prices of 10½c per pound is worth 89c. It logically follows that the most that a crusher can pay for a bushel of beans on this basis is $2.83 basis country points.

During the coming soybean crop year, it is believed that the usual seasonal price pattern will prevail. There is no particular reason for producers to sell at less than the support level of $2.56 or to expect more than approximately $2.93 if present price ceilings continue.

N. V. Whitechair, Marketing Economist, Kansas State College

Install INFRA - RED HEAT LAMPS Safely

C. L. Hamilton

Agricultural Engineer

National Safety Council

UNSAFE electric wiring and make-shift heat lamp units have led to costly fire losses and injuries in electrical brooding of poultry or livestock. Even pigs have been electrocuted by biting into unprotected electric cords.

Frequently heat lamps are thoughtlessly screwed into any socket or extension cord available. These hasty installations become costly when a fire or accident results. The increasing number of losses has made it necessary for many insurance companies to raise insurance rates, or void the benefits of insurance to users of infrared lamps with unapproved installations.

One of the first essentials for safe and efficient use of infrared heat lamps is an ample supply of power. Buildings for infrared brooding must have an approved electric service entrance, including ground and entrance cabinet (fuse or circuit-breaker type) to assure adequate capacity for anticipated load.

Heat Lamp Installation

1. Circuits serving infrared heat lamps must be permanently installed. They should also be checked and approved by a competent electrical inspector. For ordinary farm brooder or farrowing house circuits use an acid resistant, nonmetallic sheathed cable with No. 12 A.W.G. wire protected by fuse or circuit breakers rated at not more than 20 amperes.

The maximum load for any one circuit should not exceed 80 per cent of rated capacity, seven 250 watt lamps or a total of 1,750 watts. Never use a larger fuse to permit the use of extra lamps. Where more than seven 250 watt lamps are to be used, divide the load into separate 20 ampere circuits.

3. An appliance cord that provides ample protection against moisture and heat is required. Cord and socket temperatures tested by Underwriters' Laboratories have been as high as 90 degrees Fahrenheit above the Na-

tional Electric Code limit for rubber insulation. To prevent deterioration and the development of fire or shock hazards under these conditions a special rubber jacketed asbestos insulated cord (HSJ) must be used.

Special techniques are also required in connecting this cord to socket terminals. The loose asbestos rovings must be whipped down around each conductor after the outer jacket is removed. A heat resistant whipping material such as asbestos string or fiber-glass insulating tape is needed to protect the rubber insulation in and immediately above the socket. Means for protecting the insulating materials from excessive flexing, and the terminal connections from strain is also needed and provided by manufacturers of good equipment.

A heat resistant wire with asbestos insulation may also be necessary for wiring some multiple lamp installations where high temperatures are encountered. The length of appliance cord is limited to eight feet with No. 18 wire for small units, No. 16 wire for four lamp units and No. 14 wire for six lamps.

3. Suspend the heat lamp unit securely by chain, wire or bracket. It should never be hung from the cord. Both the lamp and cord should be high enough or otherwise protected so poultry or animals cannot contact it and never closer than 18 inches from the litter or cumbustible material. A chain hanger provides a convenient way to adjust the height as recommended by agricultural colleges for various brooding uses.

4. A heat resistant porcelain receptacle of the keyless (switchless) type should be used because of the high base temperatures of the lamp. Ordinary rubber, plastic or brass receptacles deteriorate and develop hazards due to the excessive temperatures.

5. Heat lamps should be protected from moisture and mechanical injury by means of a nonremovable guard with a reflector type top. The guard should be designed so it will hold the lamp a safe distance from the litter and permit the fixture to roll over, so heat rays will be directed away from the litter, in case the unit accidentally falls while still connected.

The guard also facilitates handling and safe storage or transportation of the unit. The lamps need protection from mechanical injury and surface scratches, and they should not contact cold objects when hot.

Infrared Heat Lamps

An infrared heat lamp is just what the name implies, a lamp that is designed for higher infrared energy output and lower light output than an ordinary light bulb. In fact, it is really a radiant heating element enclosed in a

glass bulb. Infrared energy passes through air without heating it, but when it strikes an absorbing body, such as a chick or pig, it is absorbed and transformed to heat. The litter is also heated in the same manner. Adjacent air is warmed by contact with the objects heated. These lamps heat in much the same way the sun heats the earth and surrounding air.

The two types of infrared lamps in general use are — (1) Hard glass (Pyrex) and (2) soft or clear glass. They are available in three sizes—125 watt, 250 watt and 375 watt.

Although it is more expensive, the hard glass lamp is preferable because of its resistance to breakage from water. It can be identified by the red filter which helps reduce the visual light rays. Both types produce the same intensity of infrared heat rays. The light output of a 250 watt clear glass infrared bulb is about equivalent to a 100 watt ordinary incandescent bulb.

All of the heat lamps have reflectors built into them so the infrared heat rays can be directed and spread over a specific area or object. The filaments merely glow red hot instead of white hot, as does the ordinary light bulb. This means slower oxidization of the filament and longer life bulbs. Heat lamps have a life of about 5,000 hours or five times as long as ordinary light bulbs.

The application of infrared heat lamps to brooding of chicks, pigs and lambs as well as other farm uses is a comparatively recent development. Its popularity and rapid adaptation to farm uses has spread faster than the recognition of accident hazards involved.

If the safety precautions outlined are observed, especially those pertaining to electric wiring, infrared heat lamps can be used safely as well as effectively.

New System for Grading Market Hogs

Slaughter hogs are now commonly sold in this country by live weight. Not enough emphasis is given to actual quality of carcass, say researchers from 12 midwest states. They favor a grade on pork based upon study of the carcass.

The new standards would give the housewife a better choice of pork cuts, because the hog farmer would have more incentive to produce the favorite hog type. He would get a premium on the high grades. The specialists found that thickness of fat at three places along the back proved the best single measure for predicting final value of the carcass. With this and other information, they have developed five carcass grades. —*University of Wisconsin*

History of Beef Cattle in the United States

J. J. Wanderstock

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A STUDY of the history of beef cattle in the United States is made more interesting when it is considered that the foundations of cattle husbandry were laid in every one of the 13 original colonies and in the south and southwestern part of our present United States before any appreciable progress had been made in the systematic improvement of cattle in England and Continental Europe. Authentic records of this early development are rather few.

Introduction of Cattle

Speculation has it that "neat cattle" were introduced into the Americas by the Norsemen several centuries before the discovery of the continent by Columbus; however, there is no recorded basis for this assumption. Columbus made a second voyage in 1493, carrying with him, besides colonists, a large variety of agricultural seeds and plants, and the first shipment of domestic livestock destined to inhabit the New World.

By 1512 stock raising had become a fixed industry in the West Indies, and considerable numbers of cattle were being raised. In 1572 the cattle business was flourishing in New Spain (Mexico) and it is written that one man had 20,000 head. In 1539 cattle were taken from Mexico into the present boundaries of the United States, and in 1541, 500 cows were taken across the Rio Grande by Coronado.

Cattle were taken into Florida from the West Indies by the Spaniards about the time that the first settlements were effected. In 1598 4,000 cattle were taken from Mexico into what is now the state of California and these were the nuclei for large herds that showed the influence of Spanish ancestry for many, many years. The town of Santa Fe was established in 1609, and the cattle business was planted firmly in that section of the country. These Spanish cattle were rather large animals with long, heavy horns, and comparatively coarse flesh. Thus it would

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appear that the early Spanish cattle had a great influence on the cattle of the colonies.

The French brought cattle to their settlements along the St. Lawrence Valley as early as 1541 when Cartier made his second voyage to the New World bringing with him cattle, goats, hogs and other beasts. There is some evidence, however, that cattle were introduced into that section of the country prior to Cartier's voyage by the Portuguese.

The Dutch first imported cattle into New Netherlands in November, 1625, and they played an important part in early Dutch agriculture. In 1650 due to the losses of cattle in the Indian War, they passed a resolution which forbade the exportation of cows from the whole colony except by permission of the governing council. The Swedes brought cattle with them—coarse, large beasts, yellowish in color.

According to Captain John Smith, cattle were first brought over by the English on May 10, 1611. The first colonists valued their animals very highly. Little has been written about their early use; however, what has been recorded indicates that they were used as draft animals. In spite of the great interest in cattle, multiplication was slow. In Virginia there were 144 head of cattle in 1616. By 1627, the number had increased to 2,000, most of which had been imported.

The Plymouth colony did not import cattle until 1624. These cattle were mostly of the Devon breed. Dutch cattle were also imported. The cattle imported by the English were of mixed origin —English, Irish, Dutch. By 1622 the Carolinas were becoming the "Cattle Country," due to the low cost of production. As an indication of the development of the cattle industry in the south, Gov. Nicholson of Maryland in 1695 spoke of the "vast flocks of cattle" in the Carolinas, and Nairne wrote that South Carolina had more "black cattle" than any other English colony. This continuous reference to black cattle probably referred to the descendants of the early Spanish cattle.

The initial mass importations of cattle from Europe into the North American colonies ceased about 1640.

Early Importations of the Common Beef Breeds

The Shorthorns were reported to be first imported into America in 1783. There were two distinct breeds, one called the milk breed and the other the beef breed. The so-called beef breed was probably one of the older types maintained in the Holderness district of Yorkshire. They were long horned, rangy, uneven in conformation, and slow maturing. The Patton family of Kentucky were

pioneers in early Shorthorn history. Matthew Patton was practically the founder of cattle feeding as a profitable business in the Ohio Valley.

The American Shorthorn Herdbook was established by Lewis F. Allen of Black Rock, New York, in 1846. The Polled Shorthorns were established in 1885 in Ohio, Indiana, Iowa and Illinois.

The earliest recorded importation of Herefords into America was in 1786 along with Shorthorns. Henry Clay's importation in 1817 was actually the first solely Hereford importation. In 1881 the American Hereford Record was first published by Miller. Polled Herefords were established in the United States and Canada by about 1890.

The first known shipment of Aberdeen - Angus cattle to the New World was in the form of a present from Lord Southesk to Sir George Simpson, an official of the Hudson's Bay Company, at Montreal in 1859 or 1860. In 1873, George Grant of Victoria, Kansas, imported four black polled bulls. It is not known whether they were registered but they were the first polled cattle to appear in the American Showyard. The Aberdeen-Angus Breeders' Association was organized in 1883 and the first volume of the herd book was published in 1886.

From the earliest settlement of the vast agricultural regions of the lower Ohio and upper Mississippi and the lower Missouri River Valleys, the Shorthorn had been the main reliance of the farmers who cashed in on their corn and bluegrass via the feedlot route. Up to the late seventies of the nineteenth century, the "red, white and roan" held almost undisputed sway. This picture was changed when the Hereford appeared.

The establishment of the annual Chicago Fat Stock Show in 1878 proved the beginning of a new era in the western cattle trade. The Herefordshire made more friends on the range. The early maturing, quick fleshing Scotch Shorthorns were brought in to check the Hereford offensive. Just when this situation had cleared up, a third breed appeared in the picture—the Aberdeen-Angus. This breed working against great odds but being a rapid maturing one became popular with fatteners of cattle and soon started its amazing record of winnings over the block.

Beef Cattle Production

The original 13 colonies saw the rise of a beef cattle industry during the latter part of the seventeenth century due to their readily available open grass land. In the north, the Connecticut River Valley and in the south the Shenandoah Valley furnished

abundant grass for cattle. When the Ohio River Valley was settled it became the scene of a prosperous beef cattle industry. In 1805 George Renick of Ohio started to drive his steers to Baltimore, a distance of 350 miles, where he sold them very profitably. The fat cattle were driven to seaboard cities, principally Baltimore and Philadelphia, where they were sold to local butchers. The trip of Renick stimulated production in the Ohio Valley, and in 1852 the first shipments of cattle were made by rail from Cincinnati, Ohio, eventually reaching New York, a journey which took about two weeks.

The year 1820 saw the development in the country now occupied by New Mexico, southeastern Texas, and southern California of very large ranches. It was the merging of the imported stock with these cattle of Spanish origin that led to the development of the range cattle business. The cattle were mainly of the Longhorn type. "They are, indeed," commented a Scotch observer, accustomed to sleek Polled Angus and Aberdeen, "nothing else than Spanish cattle, direct descendants of those unseemly, rough, lanky, long horned animals, reared for so long and in such large herds by the Moors on the plains of Andalusia." They were of light carcass with long legs, sloping ribs, thin loins and rumps, and a disproportionately large belly. In color they were nondescript, yellow, red, dun and black, with often an iron gray stripe along the back. Their meat was coarse and stringy. They were almost as wild as the buffalo they supplanted on the range.

Pioneers who went to the southwest saw the opportunity of raising cattle and soon large ranches developed. The drawback to the southwest in the early days was the lack of a market, and it was not until after Civil War that a suitable outlet for these cattle was created. The discrepancy between the price received at the northern market and that received in Texas by 1845 when she was admitted into the Union led to the trailing or driving of cattle to northern markets.

Abilene and Dodge City, Kansas, were the first important centers for the sale of Texas cattle driven overland. In 1867-1868 it is said there were thousands of carloads of Longhorn steers shipped east out of Abilene. Ogalalla, Nebraska, later became an important center. The outbreak of Texas fever caused a momentary lull in the industry, but when it was found that southern cattle that had been exposed to northern climate did not get it, there was a slight boom in the popularity of Texas cattle.

The desire for new pastures

and markets led to a northward movement of cattle. The native Texas cows were bred to bulls of improved breeding. The Shorthorn was extremely popular for a time, especially with Scotch outfits, but gradually was supplanted in popularity by the Hereford.

From 1870 on, the cattle industry in the rich grazing lands of western Nebraska, Wyoming, Montana and the Dakotas grew up almost overnight. Gradually the improvement of the range cattle took place by the use of purebred bulls, and the cattle assumed a new appearance. The long horns, so characteristic of the early animals, were considerably shortened; a tendency to fatten at a younger age was observed; and a great improvement in the fleshing qualities of both the breeding and steer herds was realized.

The numbers of cattle increased so rapidly that by 1886 many areas could not support the animals contained on them and the cattle went into the winter with no adequate supply of feed. The winter of 1886 was unusually severe and losses were great. It is said that cattle losses ranged from 30 to 100 per cent. By the spring of 1887 the knockout blow had been delivered. To cap the climax, 1887 was a poor year for crops in the Corn Belt. The demand for feeder cattle was therefore light and the prices were correspondingly low. This year marked the beginning of the end of the open range method of cattle raising. The large outfits were forced to divide into smaller concerns that were better able to give care to their cattle.

A change in the Corn Belt States was also taking place as the range was being altered. Prior to 1875, almost every farm maintained a small breeding herd and fattened native steers at a very slow rate. The lower price of range steers caused a shift away from fattening the native steers, a change which proved profitable.

Thus with the marked reorganization of the range and the changes in the Corn Belt areas, the century turned.

Vesicular exanthema, the disease which has recently caused the quarantine of swine shipments in several instances, does not affect cattle, sheep, other ruminants or humans.

Instead of improving a little ground well, we attempt much and do it ill. A half, a third, or even a fourth of what we mangle, well wrought and properly dressed, would produce more than the whole under our system of management. *George Washington, 1797*

For Farm Homes . . .

HEAT PUMPS

Condensed From Capper's Farmer

Clyde Zimmerman

WOULD you like to heat and cool your home economically with well water and let a pair of thermostats take over the air conditioning job, summer and winter? Then you'll want to hear the heat pump story as told by three farm families in Reno county, Kansas. Visit the Richard Wellmans, the Darrell Dunns or the Henry Shirers, and you will get essentially the same tale of complete satisfaction with their push button air conditioning.

First to use the new method was Richard Wellman, who listened three years ago when he heard about heat pumps from Jack Davis, manager of the Ark Valley REA Co-operative Association. Davis has a lively interest in heat pumps, because they help to even electrical load for the co-op.

Wellman was remodeling a single story, ranch-type house and was in need of a heating system. His basement is scarcely big enough to turn around in, but the compact heat pump unit fits in nicely. Only attention it needs is to have valves changed once a year when switching from heating to cooling.

A unit that would take heat from the ground, or from the air, might have been installed by Wellman, but he decided on the type that uses water. His well is 30 feet from the basement and water is lifted about 20 feet by a one horsepower motor. Water comes in the year around at a temperature of about 58 degrees Fahrenheit. The heat pump, functioning much like an electric refrigerator, extracts about 10 degrees of warmth from the water, concentrates this heat, and delivers it at a temperature of 100 degrees Fahrenheit, so that a fan can force it through ducts into rooms above. Return ducts bring cool air back to a chamber over the fan.

Just as does a refrigerator, a heat pump has a liquid refriger-

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Topeka, Kansas

ant, a compressor, condenser and evaporator, expansion valves and a motor to drive the compressor. In summer the operation is reversed. The fan sucks warm air out of the house. This time well water is used to absorb the heat. Moisture condenses on the coils and is discharged into a drain. Last summer Darrell Dunn noted that 17 gallons of water was removed from his nine room house on a hot sticky day. Both Dunn and Henry Shirer, the third in the group to have a heat pump, have humidifiers that automatically add moisture to air in winter when the house is too dry.

Visitors at the heat pump homes always ask how much water is used and what is done with it. Kansas State college engineers, much interested in heat pumps for farms, have equipped the three units with gadgets that automatically record performance information. Chester P. Davis, engineer, who visits each home monthly to check the machines, says that on a day last winter when it was 20 degrees below zero, Wellman's used 17,000 gallons of water.

Wellman remembers that day. He went out in the morning and ice was just beginning to form in his circular stock tank. The reason the 31 foot tank wasn't frozen solid is that water from the heat pump is discharged into it. Last winter Wellman had up to 500 cattle in four corrals around the tank.

"Steers would plunge their heads deep into the water and drink," Wellman said. "I believe they drank more because water was ice free and they gained enough extra during the winter to nearly pay for my heat pump. This could have been accomplished with a tank heater, but was a free by-product of heat pump operation."

Wellman has a small pit in his back yard which has a valve so that water can be diverted from the tank for irrigation. He can hook hose to lawn sprinklers, or use the hose to flood irrigate an acre of garden. Drainage ditches slope away from the garden and fruit trees and conifers are planted on the ditch sides. At the Dunn farm the water is used on the lawn during the summer but otherwise is discharged into an abandoned dug well 75 yards from the house. Shirer also has a disposal well.

Everyone who hears about the heat pumps is interested in costs. The three in Reno county are supplied by one manufacturer. Dunn's is a seven and one-half horsepower unit, the other two are five horsepower. Each costs about $2,500, installed. Since the plants do both heating and cooling, the users do not consider this first cost excessive.

Power costs the heat pump

owners about one and one-half cents a kilowatt hour and Wellman says that one year his electric bill for heating and cooling was $140. Shirer says he paid just over $200 for 18 months. On the heating cycle his electric bill averages just under one dollar a day. Dunn says his bill is about $35 a month in cold weather. The electrical energy needed for heating is about 15 times greater than for cooling. Last year during July and August Shirer's electrical bill for cooling came to $5 a month.

Two Flock System for Poultrymen Recommended

Egg surpluses in the spring and shortages in the fall have long caused trouble for poultrymen as well as consumers. Research and practical experience have now shown that the ups and downs of production and prices can be held fairly constant through the use of the two flock system.

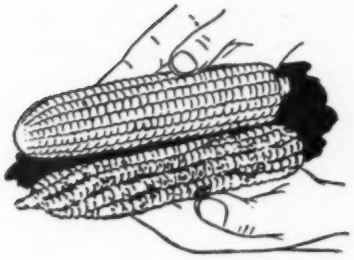
According to W. J. Moore, poultry husbandman for the Texas agricultural extension service, the two flock system simply means hatching chicks for flock replacements in both the spring and fall. When following this system, the poultryman has two flocks of different ages and since they must be kept separated at all times, two flocks are actually maintained.

The extremes in both production and egg prices, in addition to creating an unstable business, cost producers and consumers millions of dollars annually, says Moore. As an example, the specialist cites the conditions that existed last spring. Egg supplies piled up and prices dropped far below the cost of production. Presently egg prices, compared to last spring, are high and likely will remain that way until the flush production of next spring hits. The low egg prices last spring caused producers to cull heavily and to reduce the number of replacements and this fact may have a strong effect upon next year's egg prices.

Moore believes the two flock system will aid in overcoming this situation. The fall hatch of chicks should be obtained in October or November and the spring hatch in March or April. He says a rigid culling program should be practiced to keep the laying house mortality low. The sale of culls will often times come close to paying the cost of growing a replacement pullet.

Records kept in another state last year show that poultrymen who followed the two flock system increased their profits by 10 per cent.

The Weevil Meets His Match — An Easy to Apply Dust



Condensed From Farm Journal

Henry M. Simons, Jr.

IF YOU live where weevils cause trouble in corn, here's good news for you. There's a new bug killing dust that you can mix with the corn when you put it into the crib this fall, and it will prevent insect damage this winter.

That's especially welcome news for corn growers in the southern half of the country, where weevils ruin a fourth of the corn every winter.

The dust is called Pyrenone Grain Protectant, and is only slightly different from Pyrenone Wheat Protectant, a dust used by wheat growers to protect wheat during storage.

This corn dust prevents insects from getting a toe hold in new corn stored in open cribs and bins.

Farmers and scientists have been testing the treatment for the last three years, with remarkably good results.

For instance, W. V. Tyler, Georgetown County, South Carolina, treated 800 bushels of ear corn while putting it into an open crib last November. When he opened the crib this summer, the corn showed very little weevil damage.

Tyler figures that the dust kept weevils from destroying $200 worth of corn in that one crib alone. Yet the cost of the treatment was only $20, or 2½c per bushel.

Here's how to use the protectant: Spread the dust (1.6 ounces per bushel, or 10 pounds per 100 bushels) over each foot thick layer of corn while filling the crib. Farmers say that a rotary dust gun, like those used on tobacco beds, is ideal for putting on the dust. Or you can use just an ordinary dust gun.

Another method: Put the dust

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Philadelphia, Pennsylvania

in a burlap bag and shake it out evenly over the corn.

Regardless of how you apply dust, be sure to spread it evenly, and mix it in with the corn. Since the dust has no fumes, insects have to come in contact with it to be killed. That's why good coverage is extremely important.

The dust will protect both shelled and ear corn. With ear corn, it's best to remove most of the husks or shucks, especially if the corn is already infested when it comes from the field.

When you crib infested *snapped* corn (with the husks still on), the dust *reduces* damage considerably, since it keeps weevils from going from infested ears to clean ones. But you'll still have some weevil damage.

Part of the trick is to plant weevil resistant varieties—hybrids with tight fitting husks—so that weevils will have a tougher time getting into the ear while it's still in the field.

Actually, the dust works best on shelled corn, but most corn is too high in moisture when it comes from the field to be stored as shelled corn.

How long does the treatment last? The dust has protected corn in many tests from picking time until well into the next summer —sometimes longer.

The dust is practically non-poisonous. You don't have to wear a mask or worry about inhaling it, and you could eat the treated corn yourself, or feed it to livestock, without harm.

Scientists warn that the dust alone won't solve all your weevil problems. You should:

1. Clean out old cribs and bins. Either burn or feed any old grain and trash left over from last year's crop. (Weevils live over from one year to the next in old grain and rubbish.)

2. Spray the crib—walls, ceiling and floor—with DDT, TDE, methoxychlor, chlordane or an emulsion containing one per cent piperonyl butoxide and 1/10 per cent pyrethrins. Put on about two gallons of spray per 1,000 square feet with an ordinary garden sprayer.

3. Treat the corn with Pyrenone Grain Protectant as it goes into the crib.

In some parts of the south, centralized storage permits drying and fumigation of shelled corn.

Pyrenone Grain Protectant costs about 25c per pound; is manufactured by U. S. Industrial Chemicals Co. of New York. Your dealer has it or can get it from the manufacturer.

It has been estimated that 25 per cent of the nation's total crop production in 1951 resulted from using fertilizers.

Can You Pump Your Neighbor Dry?

Condensed From Business Week

THE day is past when western ranchers faced each other over water holes with angry faces and drawn guns. But battles are still going on, no less bitterly and desperately, in the courts of many dry states west of the Mississippi. Weapons today are legal and legislative actions.

A crucial case is now awaiting decision by the Arizona supreme court. The protagonists are Tom G. Bristor, 54, and his neighbor, Armon D. Cheatham, 75.

In 1922, Bristor gave up his job in Mansfield, Ohio, and went to Arizona for relief from asthma and sinus trouble. He decided to settle there. In 1929, he bought a modest ranch of 24 acres in romantically named Sunset Cove, a valley a mile long and a half a mile wide, 12 miles from Phoenix.

Of course, one of the first things Bristor inquired about when he considered buying the farm was the water supply. He was told that wells had been drilled as early as 1916 and that water was ample. During 1930 he drilled a new well to a depth of 170 feet. That gave him plenty of water for cooking, washing and sanitation—he buys bottled water for drinking.

Bristor farmed 15 acres of citrus trees to add to his income from investments in Ohio, where his father was a banker. In 1945 he married a former schoolmate from Mansfield and began planning a new home, which was finished last year.

Meanwhile, he was getting worried about his water supply. In 1945 the level in his well began dropping fast, and in July, 1949, the well ran dry. To get an adequate supply of water, it cost him $1,200 to drill a new 230 foot well, using the original pump.

Bristor didn't have far to look for someone to blame for his water problem. Three miles down the valley, in view from the new Bristor homesite, Armon Cheatham and his four sons were expanding their ranch, drilling new wells that, Bristor claims, draw upon the same underground water supply.

Cheatham and his wife, Lula,

Reprinted by permission from Business Week
New York 36, New York

71, started out in 1919 with 40 acres, then gradually enlarged their holdings, in later years with the help of their sons. Now the sons all live in $4,000 - $5,000 homes within a mile of each other and the dairy farm they help run.

The family owns 800 acres, leases another 1,000 acres through the Indian Service and an additional 180 acres from a private owner. This year they are growing 1,000 acres of cotton and 800 acres of feed. They also run a feed-lot dairy (no pasturing) with 1,000 head of Holsteins, 425 of which are milkers.

From their co-operative efforts last year the Cheathams grossed about $500,000. Most years, until prosperity came in 1949, none of the clan took over $50 a month out of the operation except in emergency. Profits went into expansion of the business.

Between 1946 and 1948 the Cheathams drilled five new wells, four on land they owned, one on leased land. One was a dry hole. The four now operating average 400 feet deep.

The water is used for the dairy operation, for domestic use in the various Cheatham homes, and some for irrigation. Much of the irrigation water, however, is supplied by the Salt River Valley Water Users' Association, from which they have the right to take two and one-half acre-feet a year (the amount of water required to cover one acre to the depth of two and a half feet).

One of Bristor's meatiest contentions is that the Cheathams transport water from some of their wells to leased acreage by canal and ditch. This the Cheathams admit. They point to one well that flows at about 3,500 gallons per minute and say its water goes to leased lands as much as one and three-quarter miles away.

The Cheathams contend that when they drilled their wells there was no law preventing them either from drilling the wells or from transporting the water elsewhere. This is one of the prime issues in the case.

Bristor and 21 other plaintiffs filed their complaint in the Maricopa county superior court on August 11, 1949. They alleged that excessive pumping of water by the defendant Cheathams and a dozen other defendants was depriving them of their fair share of underground water derived from a common source.

The trial judge dismissed the suit on December 17, 1949. Plaintiffs promptly appealed to the Arizona supreme court. On January 12, 1952, the court voted 3-2 to reverse the judgment of the trial court and find in favor of the Bristor side. Just as promptly, the Cheathams filed a motion for a rehearing. One of the majority justices shifted sides, and the motion was granted,

again by a 3-2 vote. Decision after reconsideration is expected in a few months.

The Legal Issues

There are three legal concepts of water rights, as they apply to underground supplies (not to watercourses):

(1) The English "common law" theory that says, in effect, that the owner of land possesses everything under the ground, down to the center of the earth—including the groundwater—and can do as he pleases with it. This is limited only by . . .

(2) The more recent theory of correlative rights. This holds that an owner can do pretty much as he pleases with the ground and its water but must respect the rights of his neighbors.

(3) The third theory is known as "Public Property and Prior Appropriation." It says that underground water is really in the public domain, that the first man to drill a well has the right to his full water requirements, then the second man, and so on down the line until the supply is exhausted.

Until the supreme court reversal of January 12, 1952, in favor of Bristor, the courts of Arizona had generally followed the English common law, though a few decisions sought to prevent grave injury to a neighbor (the correlative rights theory at work).

Regardless of the final decision by the state supreme court, the showdown fight for Arizonans will come in the legislature next winter. Advocates of strict groundwater control are sure to push a water code similar to one that died in committee last February after a knockdown fight. Opponents again will try to stall such a control law.

The fight isn't just for code or no code. Many sincere dissenters feel merely that the time isn't ripe for codifying rules about how much water each class of user can draw in various sections of the state. Not enough is known yet about the geology and hydrology of Arizona, they say; even the experts disagree about how the groundwater reservoirs are interrelated and how they're replenished.

Gov. Howard Pyle appointed an eight man committee last August to draft the code that was killed in the legislature in February. This code divided the state's 13 recognized groundwater basins into three classes:

CLASS I, basins in which the water table is not seriously affected. Pumping here would be unrestricted.

CLASS II, those whose rate of recharge about balances present pumpage. No new land could be brought into cultivation here, and no new wells drilled except as replacements.

CLASS III, those where the water table is steadily dropping or is

far below a safe level. Here the only remedy is to reduce the take of water. The proposed state water commissioner would be limited, however, to cutting any user's pumpage no more than 25 per cent in any one year.

When this code was pigeonholed in committee, the legislature passed a bill calling for a 24 man commission of farmers to make a new study and to report by January 1.

Meanwhile, pending the outcome of Bristor vs. Cheatham, and any new laws that may be passed, all water litigation in Arizona is at a standstill.

Economic Effects

Arizona is being catapulted into a crisis over water because, like other southwestern states, it's developing faster than the country as a whole. Irrigated acres under cultivation amounted to 198,000 in 1900; 391,000 in 1915; 607,000 in 1930; 1,100,000 in 1951. Total value of farm crops rose from 28½ million dollars in 1935 to 300 million in 1951.

About 80 per cent of the irrigation water comes now from underground sources, the rest from streams and reservoirs.

State Land Commissioner W. W. Lane estimates that the number of wells has risen from 3,000 in 1930 to 5,464 in 1951. In this same period, the average—subject to wide variables — groundwater table has dropped from 75 feet in 1930 to 150 feet last year.

The Salt River Valley Water Users' Association, which supplies some water to the Bristor and Cheatham lands, had to deepen or redrill 50 wells in 1947-'51 because of "the dropping water table or wearing out of equipment."

"During 1951 alone," said its president, W. W. Pickrell, "we started redrilling and equipping 15 wells and sinking 15 new wells, all to a depth of from 500 feet to 1,600 feet, at a total cost of $790,000."

Part of the project's outlay is to meet increased demand for irrigation rather than just to keep up with a dropping water table. In 1920 the association pumped 55,000 acre-feet of water; in 1930, about 351,000 acre-feet, and in 1951, about 450,000 acre-feet.

Publicity about the first supreme court decision in Bristor vs. Cheatham aroused panic that water rights would be thrown into confusion. The state's two largest banks, the Valley National and the First National Bank of Arizona, ran a series of newspaper ads counseling calm, lest the fuss alarm newcomers to the state and "frighten away dollars that are seeking employment here."

The banks assured farmers that their policy on loans wouldn't change. Farmers had feared they wouldn't be able to borrow on

their unharvested crops as in the past. Other chief worriers were farm equipment companies and the Arizona Power Authority, which saw danger that electricity use for pumps—50 per cent of its power sales—would shrink. When the supreme court issued its first decision, one equipment company had $400,000 worth of orders canceled, nearly one-quarter of its order file.

However, as Walter R. Bimson, president of the Valley National bank, put it: "No person with any sense of judgment feels that Arizona is suddenly going to dry up and blow away."

Predict Good Business Conditions Through '52

Next year may see the turning point in the greatest business boom on record, according to Allen G. Waller and John W. Carncross, Rutgers university agricultural economists. They anticipate that as the United States catches up with its defense program, some downward adjustment in business and prices can be anticipated.

However, they expect a continued favorable business situation for the remainder of 1952 and on into 1953. They point out that our whole economy is buoyed up by the increasing expenditures for defense production. These expenditures, which were originally expected to reach a peak by the end of 1952, have been stretched out and the peak is now expected sometime in 1953.

Here is the way Profs. Waller and Carncross analyze the situation:

"At present, business activity and prices are at a very high level, higher in fact than many thought could be maintained for such a long period. The decline in the nation's total production caused by the steel strike will necessitate high production in many lines to catch up with the demand. Even the textile industry, which was plagued by excessive stocks, shows a more favorable price situation and an increased rate of production.

"Another factor supporting business activity has been the continuance of a high level in the total volume of construction. A substantial increase in public works has more than offset the decline in residential construction. The large expenditures by business firms for new plants and equipment has also been an important factor in our current business boom.

"Farm prices are expected to continue firm during the remainder of 1952. The national farm output of food is at an all-time high this year. On the other hand, with the steadily growing population and with record high wage earnings, the nation's consumers are demanding more food than ever before."

A Cow Can Eat Her Head Off and Starve to Death

FITTING CONCENTRATE FEEDING TO QUALITY OF THE ROUGHAGE

Condensed From Guernsey Breeders' Journal

H. A. Herman

GOOD forage, including pasture, is the basis for efficient and economical livestock feeding. The dairyman who provides plenty of good pasture, silage and the necessary dried roughages to feed his cattle all the forage they can consume, generally has the minimum feed cost per 100 pounds of milk. Pasture and grazing land account for nearly one-half of all the farm and ranch land in this country. In addition to the area devoted to grazing, over 90 million acres are used for the production of hay, silage and other forage crops. As a general rule, cattle and sheep can digest and assimilate approximately 60 pounds of nutrients from each 100 pounds of dry matter in forages consumed.

Grassland crops must supply the necessary feed nutrients to support the best animal performance. It is the common practice to feed all the forage an animal will consume and supplement the ration with enough concentrate to support milk production, growth or body gains as fits the herdsman's objectives and the best level of performance the animal's inheritance permits.

Many of our failures in dairy cattle nutrition can no doubt be traced to following a roughage feeding program which does not measure up to these essential criteria:

(a) There must be an adequate supply. Cows will eat two and a half to three pounds of hay per day per 100 pounds of body weight. If silage is fed, the hay consumption will be reduced about one pound of hay per day for each three pounds of silage. Underfeeding is our greatest problem in dairy cattle nutrition. More cattle suffer from "hollow belly" than all mineral and vitamin deficiencies combined.

(b) The roughage must be palatable and high in digestibility. A cow that is forced to graze over

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Peterborough, New Hampshire

a large area to obtain 30 pounds of dry forage that contains no more digestible nutrients than 15 pounds of high quality forage easily obtained, is not going to obtain the needed energy for profitable production. The difference in feeding value of roughages is affected most by seasonal factors (stage of growth) and climatic conditions.

(c) Good quality—Roughages vary greatly in "quality" which for all practical purposes may be called feeding value. It is reported by many investigators that the digestibility of dry matter in herbage may drop from a high value of 80 per cent in the early spring to less than 60 per cent when the crop has matured. The quality or feeding value of roughages play an important role in dairy cattle feeding.

The actual feeding value of a roughage can be determined only by *feeding trials* in which the digestibility or utilization of the food nutrients is measured. *Chemical analyses alone are inadequate to gauge quality, because we are left in doubt as to the digestible portions.* Generally speaking, the physical factors and the chemical composition are sufficiently in agreement so that a *high grade roughage* as judged by its maturity, leafiness, color, aroma and other physical factors will likely furnish the greatest quantity of nutrients.

The chemical composition of roughages depends upon (1) *the variety of plant* (botanical make-up), (2) *the stage of maturity,* (3) *the climatic conditions* (rainfall, temperature), (4) *the type and fertility of the soil,* and (5) *the method of harvesting and conserving the crop* with particular reference to the proportion of leaves saved. Quality in roughage, from a chemical standpoint, refers to the dry matter, protein, carbohydrates, crude fiber, mineral and vitamin content.

Since the chemical composition does not give a clear picture of the digestible or utilizable portions of the plant, and digestion trials are expensive, the dairyman is forced to use some quickly discernable method for evaluating roughage quality. Fortunately quality in roughages is associated in a general way with the following physical characteristics; (1) *stage of maturity when cut,* (2) *percentage of leaves,* (3) *green color,* (4) *amount of heating, spoilage, etc.,* (5) *size and pliability of stems,* (6) *aroma,* and (7) *freedom from foreign material.* If a dairyman will evaluate roughages as to their quality and modify the grain feeding program with varying quality in roughages, he will find the response in milk production most striking. The basis for this suggestion is easily understood when we briefly summarize the factors affecting the

chemical composition and the digestibility of forages.

Variety of Plant—The botanical make-up of forages, particularly as it relates to legumes and nonlegumes, is so well appreciated that it needs little discussion. Alfalfa, for example, contains 90 per cent dry matter, 14.7 per cent crude protein, 36.4 per cent nitrogen-free-extract and 29 per cent fiber. It has *10.6 per cent digestible crude protein and 50.3 per cent total digestible nutrients per 100 pounds of hay on the average.* Timothy, on the other hand, contains 89 per cent dry matter, 6.2 per cent crude protein, 45 per cent nitrogen-free extract, 30 per cent fiber, but *only 2.9 per cent digestible protein and 46.9 per cent digestible nutrients.* The ash content of alfalfa is 8.3 per cent as compared to 5.0 per cent for timothy, but alfalfa has 1.43 per cent calcium, 0.21 per cent phosphorus as compared to 0.27 and 0.16 per cent, respectively, for timothy.

Stage of Growth — Immature, actively growing plants contain less fiber, are higher in water content, richer in protein, have more calcium and phosphorus and greater quantities of vitamin A, when compared on a dry matter basis, than the fully matured plant often cut for hay. Practically all of our common roughage and pasture crops have been studies from the standpoint of changes in composition and digestibility of the constituents at various stages of growth, and without exception early harvesting—so far as commensurate with the maintenance of good vigorous stands — is universally recommended. It has been found that such practices result in a roughage higher in palatability, giving more digestible protein per acre, more carotene, a higher mineral content, and generally less fiber and lignin content which so markedly affect digestibility.

The difference in feeding value of early cut and late cut forages is often much greater than the chemical composition would indicate because as plants mature the percentage of cellulose and lignin increases greatly. Along with increased lignin content we have chemical changes occurring which tend to "bind" or render less digestible the plant nutrients.

In studies at the Missouri station, the author and his co-workers found late cut Korean lespedeza hay ranging from 15.9 per cent lignin in immature hay to 23 per cent in late cut.

In this study, matured Korean lespedeza contained only 37.93 per cent total digestible nutrients, whereas earlier cut averaged 52 per cent and compares favorably with alfalfa. This helps us explain why late cut lespedeza won't make milk- The practical solution, of course, is to harvest such

hays early. Where matured roughages are all that is available the dairyman must supply the added nutrients necessary by additional grain feeding.

Climatic Conditions (Rainfall, Etc.)—The amount and distribution of rainfall are paramount factors affecting the yield and chemical composition of forages. Dry matter, protein and mineral content are influenced. Alfalfa grown in a humid climate generally has a higher phosphorus content than that grown in an arid area. During drouth the decreased phosphorus content of herbage is a matter of concern, and on range conditions outbreaks of malnutrition among cattle have been reported.

Generally forages are highest in minerals in the spring and summer, but tend to decrease as the plants mature.

Fertility of the Soil and Roughage Quality

There is much evidence to indicate that if soils are high in available plant nutrients, it will be reflected in the chemical composition of the plants and likewise in the yield and number of animals supported per given area. Not only does the yield of forage increase when soils low in plant nutrients are fertilized and limed, the amount of nitrogen, phosphorus, calcium, etc., may show marked gains as measured by analyses of the dry matter.

Soils rich in nitrogen produce luxuriant growth when sufficient moisture is available. One of the most pronounced effects of high soil fertility is the increased yield of dry matter and the added palatability of the growing crop which is higher in water content, more tender, and readily chosen by animals over plants growing on less fertile areas. The soil composition also markedly affects the type of vegetation it will support—for instance, it is a common observation that clover increases following phosphate treatment of pastures.

Soil fertility also plays an important role in the carotene content of plants. Nitrogen fertilizers increase the carotene content of plants and according to some

Hay equivalent per 100 pounds of live weight daily			Pounds of grain concentrate to feed					
2½ lbs.	2 lbs.	1½ lbs.	Per Cent of fat in milk					
Milk produced daily pounds			3.5	4.0	4.5	5.0	5.5	6.0
29	22	15	5.2	5.9	7.5	8.2	9.5	10.2
35	28	21	7.6	8.5	10.3	11.2	12.7	13.6

workers potassium seems to decrease it. In general, there seems to be a definite correlation between the protein and carotene (vitamin A) content of roughage.

Harvesting-Conserving the Crop — Irrespective of the above named factors, the nutritive value of roughages depends upon the nutrients conserved during harvesting and storage. The losses in dry matter and in nutrients vary greatly in the harvesting of hay under adverse conditions. Rains leach out much of the soluble carbohydrates and proteins. These losses may be as great at 50 per cent in extreme cases. There are also many mechanical factors such as leaf loss which affect the nutritive value. The leaf generally contains from two to three times as much protein, minerals and vitamins as the stem portion of our common forages harvested for hay.

Hay which heats during storage undergoes a heavy loss of nutrients. Both the protein and the sugar are reduced, with the losses ranging from 20 to 75 per cent. In severe cases of leaching much of the fat and all of the carotene is destroyed. While carotene is lost during the curing process, vitamin D increases because of the action of sunlight. Carotene is also lost progressively while hay is in storage. Old hay nearly always contains less carotene than recently stored hay.

Chopped hay loses carotene as well as green color faster than long hay and baled hay retains its carotene content better than loose hay. The Missouri station reports that Korean lespedeza is richer in carotene than alfalfa under storage conditions. The matter of carotene (vitamin A) is of concern in practical animal feeding. The vitamin A content of milk depends directly upon the quantity of carotene in the feed of the cow. While animals also require vitamin D, and exposure to the sunlight increases this vitamin in the roughage, cattle which are exposed to the sun during the summer and as winter weather permits usually obtain sufficient amounts without depending upon the feed as a source.

Adjusting Concentrate Feeding to Roughage Quality — While dairymen and livestock men appreciate the difference in the response of their animals to roughages of various quality, we all too often find the feeding program little altered year after year, as if the general assumption is that "hay is hay." Undoubtedly too little attention has been paid to leaf content of hay, coarseness of stems, and stage of maturity. The micro-organisms in the alimentary canal of ruminants secrete enzymes that can break down celluloses, but lignins found in matured, woody, coarse roughages are practically indigestible.

Thus it is not uncommon to find cattle literally "eating their heads off and starving to death."

Since a dairy cow must first maintain her body before she can produce milk, all too often an inadequate intake of energy, through failure of the feeder to appraise his roughage as to quality, results in the cow being fed at maintenance levels. The result is that high priced feed, labor and investment are expended for a limited and unprofitable milk flow.

The answer to this situation calls for (a) the adjustment of concentrate feeding to fit the quality (not only the variety) of roughage available, and (b) for liberal feeding of roughages so that the cow can pick out the leaves and tender stems. These are highest in nutritive value and she won't eat too many coarse stems unless forced to do so by hunger.

Dr. F. B. Morrison attacks this problem in his 21st edition of "Feeds and Feedings" in a very logical manner by suggesting that roughage be measured in terms of *hay equivalent*. The amount of concentrate ration to be fed a given cow depends not only upon the amount of milk she produces but also on her body weight and the amount and quality of roughage she consumes. Standard feeding practices call for two pounds of good quality hay per day per 100 pounds of live weight, or the equivalent in other good roughages such as one pound of good hay and three pounds of silage.

When cows are fed very liberally on excellent quality roughages they will consume about two and a half pounds of hay equivalent per day per 100 pounds of live weight. The allowance of grain is restricted to their needs accordingly.

Where cows are fed poor quality roughage, or a scant rough allowance, the hay equivalent may be only one and a half pounds of good hay per 100 pounds per day.

To follow this plan, a feeder must determine the amount of hay equivalent the cows are consuming per 100 pounds of body weight, after deducting for waste roughage. To evaluate roughages the following conversion factors are suggested by Dr. Morrison:

Good quality legume, or early cut nonlegume	100%
Fair quality hay	80%
Poor quality hay, sorguhm stover	60%
Good silage; potatoes	33%
Oat straw; barley straw	50%

Thus if a 1,200 cow ate 30 pounds of poor quality hay per day, the hay equivalent would be only 60 per cent of 30 or 18 pounds — or one and a half pounds per 100 pounds body weight per day, not two and a half pounds, as the total hay consumption would indicate.

To feed grain, according to roughage quality, so as to provide

a balanced ration, see Table 2, part of table from P. 1187 Morrison "Feeds and Feeding," 21st edition.

From the examples given it is obvious that it will require as much concentrate mixture daily for a cow receiving one and one-half pounds hay equivalent per day per 100 pounds live weight and producing 21 pounds of milk daily as is needed for a cow of similar body weight consuming two and a half pounds hay equivalent per 100 pounds live weight and yielding 35 pounds of milk daily.

It is assumed that the grain mixtures used carry sufficient protein to provide a balanced ration when supplementing the type of roughage used. Briefly this consists of:

Roughage	Percent crude protein in grain mixture
All legume hay plus silage (or cows on good pasture)	12-14
Part legume — part grass with silage —light pasture ...	16-18
Nonlegume — mixed grasses, with silage or fodder	20-22

The job of appraising roughages and fitting the concentrate feeding program is largely up to the feeder and his feed dealer. It is a worthy endeavor for both and will pay dividends in economical production, better performance and the efficient use of feed and labor on the dairy farm.

Bulk Milk Handling Coming Soon

Bulk handling of milk should be an improvement over the old "can method" of getting milk from the cow to the bottle. Delmar J. Young, Delaware dairy specialist, lists several reasons why he is in favor of the bulk method.

In the bulk method—daily weights, butterfat, sediment and bacteria checks are made at the farm. This gives the farmer an easy way to keep records and check production. The money angle enters in three ways: One, savings on milk can buying, replacement and cleaning; two, lower hauling rates. Third, there is a saving in electric bills because milk is cooled directly, and the electricity has to be on only when the tank is being used.

Quality is improved, because milk is cooled more quickly. Milk is poured directly from the pail into the tank, where it can be cooled within 15 minutes after the complete milking operation.

There are problems, too, Young advises. The cost of equipment is high at first, but it is repaid through savings in two or three years. Cleaning the tank is a problem. Tank capacity is hard to judge. Allowances should be made for herd expansion. Refrigeration units have to be kept in top working order.

How to Clear Pond Water

Condensed From Successful Farming

DOES your farm pond get muddy and murky looking in the spring and stay that way all summer?

There is a new and cheap way to keep your pond water clear for livestock, swimming, fishing and even household use. Just add some agricultural gypsum or commercial aluminum sulfate to the pond, and it will clear up immediately.

Recent tests of two muddy ponds in Missouri by C. M. Woodruff, soils research man, and Marion W. Clark, extension agricultural engineer, gave these results:

"The water in one large pond was so muddy before it was treated that one could not see the fingers when the hand was submerged up to the wrist," Woodruff said. "And following the treatment, minnows could be seen at depths of two to three feet. Laboratory tests showed that the treated water transmitted 94 per cent of the light compared with 100 per cent for average, good city water."

This large pond is on the farm of Harold Riback, Boone County, Missouri. He reported that the fish in the pond definitely started biting as the gypsum was applied and as the water in the pond became clear.

Is it difficult to treat a muddy pond? Not at all. If you use gypsum, scatter it over the pond from a rowboat in order to get some of it over most of the pond's surface. If you use aluminum sulfate, it doesn't need to be spread over the surface of the pond because it dissolves readily in water. Aluminum sulfate was poured into an old tub which was carried out into the shallow area, filled with water, stirred, and the dissolved solution poured into one of the test ponds.

Which is the best, gypsum or aluminum sulfate?

Aluminum sulfate is about four

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Des Moines, Iowa

times as effective as gypsum, according to Woodruff, and probably more advisable if the pond water is to be used for household purposes. Woodruff says this aluminum sulfate treatment is essentially the same as that used by most water purification plants when city water is obtained from lakes or small streams. Total cost of treating a pond will be about the same with either gypsum or the aluminum sulfate.

Agricultural gypsum is easier to purchase than the aluminum sulfate, as most lumberyards carry this product. Commercial aluminum sulfate must be purchased through chemical supply houses in the larger cities.

Total cost of treating the average sized pond should be about $10 to $15. Gypsum is a white powder used for making plaster. The amounts of gypsum required in the two tests conducted on Missouri ponds amounted to from 11 to 13 pounds per 1,000 cubic feet of water. In some instances less gypsum will be required and in other instances a little more will be needed.

A rule of thumb for estimating the volume of a pond is to consider the average depth of the pond to be one-third of the depth at the deepest point. This average depth multiplied by the area in square feet gives the volume of water to be treated. Figuring 12 pounds of gypsum for each 1,000 cubic feet of water gives the seven bags required for the average half acre pond. More can be added when necessary.

Aluminum sulfate is about four times as effective as gypsum. Use only 3.5 to 4 pounds of the aluminum sulfate per 1,000 cubic feet of water.

"The fertilizer used on the cover crop of the pond's watershed has much to do with keeping your pond clear," Woodruff says.

Phosphate should be applied to the watershed. "For this purpose, the 20 per cent superphosphate is better than rock phosphate or 45 per cent superphosphate," Woodruff said.

How long will your pond remain clear after treating?

One pond treated with gypsum last spring went through the exceedingly heavy rains of last summer when the Missouri river went on its record breaking rampage. There was ample rainfall last winter and the water is still classified as clear. This water is being used in the household.

Another pond treated with aluminum sulfate last summer had the same heavy rains and is still clear.

The size of the watershed and the amount of water which runs through the pond is important. Gypsum or aluminum sulfate are carried out of the pond more quickly as the flow increases.

These North Dakota Farmers Decided They Couldn't Afford Not to Fight Weeds . . .

HOW MUCH FOR WEEDS?

Condensed From The Farmer

Robert G. Rupp

WEEDS cost South Dakota as much in one year as does the state government in two years—$44,000,000. Minnesota farmers pay for weeds at the rate of $6 per acre on crop land, $3 per acre on noncrop land.

From a production standpoint, nine bushels of corn are lost every time a thousand pounds of cockleburs are left growing. A ton of wild mustard will pull 75 pounds of nitrogen from the soil, while the same amount of wheat needs only 33 pounds. Mustard takes six pounds of phosphate; wheat, three.

A thousand pounds of wild oats use as much plant food as 25 bushels of barley.

Creeping jenny, in test trials, has cut South Dakota wheat yields from 21 to 12 bushels—almost half. Oats has been reduced from 44 to 30. In North Dakota, annual weeds have meant the difference between 20 and 30 bushel yields. Control authorities estimate over 2,000 acres of pasture land per county are lost to Canadian thistles in Minnesota.

Those are high costs for raising weeds.

Too high for a group of North Dakota farmers. White Ash township farmers in Renville county decided they couldn't afford to lose $20,000 to creeping jenny and leafy spurge each year.

Alarmed at the strangle hold those two vicious weeds were gaining on their crop land, they called in Melvin Berg, county agent, and Bill Purdy, soil conservationist. From that meeting came the "White Ash Weed Control Plan."

First step toward stopping the $567 loss, being suffered annually per farm family, was to divide the township into four sections. Then

Reprinted by permission from The Farmer
St. Paul, Minnesota

each section was mapped for weeds, patch by patch, according to size, kind and location. When mapped, 245 acres of crop land were found to be lost to leafy spurge, 893 acres to creeping jenny.

Armed with that information, the group called meetings, got farmers to map weed patches on their own farms, then start eradication, field by field through use of trashy fallow, row crop cultivation and spraying.

A community club was organized to keep residents abreast of control developments and to coordinate activities. Road banks were bladed off so ditches, the worst infested areas, would be more accessible for mowing, spraying and seeding to grass.

Eighteen gallons of chemical went to farmer-testers from county agent Berg's office along with questionnaires to be filled out following the farm field research. Additional information, garnered from county, state and other agencies was passed along at meetings. A tractor mounted spray rig was purchased by two farmers, county commissioners bought 2,4-D, and the rig was used to spray roadsides.

All that happened in 1946-'47. The fight is still in progress.

Not all leafy spurge or even creeping jenny has been cleaned out of White Ash township. But both have been kept from spreading. Some areas have even been wrested back from the weeds.

Estimates of reduction of leafy spurge, made by farmers who carried on the six year fight, range from 10 to 50 per cent. Creeping jenny, especially where it was sprayed when in bloom, has been cut back more. All cooperators are agreed the White Ash plan has made headway against both weeds; that it has helped control spreading.

Says Fred Sandberg, one of the plan's originators. "With creeping jenny, I found spraying on trashy fallow allowed us to find patches easier. That saved spray."

Frank Johnson didn't find he could kill all spurge patches, but he, too, kept them from getting bigger. "I feel spraying twice a year with 2,4-D and 2-4-5T will reduce spurge by 50 per cent. A 30 acre pasture, heavily infested, has been reduced at least 25 per cent.

For Herb Goettle, cultivation with a one-way every 10 days from June to freeze-up for two years killed spurge. Spraying with 2-4-D thinned patches by about 40 per cent over a four year period.

Henry Steinberger, key figure in the eradication fight, gives the original mapping program credit for much of the plan's success. "Surveying the area and giving each farm operator a map showing infestations created interest,

showed us where the worst weeds were, how they were spreading and how to systematically control them."

Most successful control of creeping jenny came when spray was applied during the bloom and active growing stage, although Orville Schultz got 98 per cent control, with little regrowth the following year, when he applied 2,4-D later than that.

Mustard, pig weeds and other annuals were knocked out of a wheat field in which they had all but taken over with a di-nitro by Raymond McLain. Although grain suffered burning because the chemical was applied when wheat was heading, he got a 15 bushel yield. Without the spray, he probably wouldn't have even harvested the field.

Frank Johnson kept leafy spurge off his farm with sodium chlorate. Although expensive for large scale use, he cleaned out small patches by spraying when plants started to bloom and again in the fall.

Economist Outlines Outlook for Farmers

Profits from cattle feeding this coming winter will be higher than last winter. Prices of feeder cattle are down and feed prices will be about the same as last winter, according to I. F. Hall, Wisconsin farm management specialist.

Hog marketings will not be as large as last year. Spring pig crop was down about nine per cent. Prices will be higher than last winter, he believes.

Milk production has dropped more than usual since the June peak. July production was the lowest since 1940. Cow numbers are lower than last year. Prices for dairy products are now rising and will be higher than last fall.

Egg prices have climbed during the past month. Production has been below a year ago. Price increases are likely to be small, however, because egg production is expected to climb.

Possible profits may be offset by higher and higher farm costs, Hall writes.

Poor wiring boosts electric bill. If lights dim when motors or other appliances go on, chances are your wiring is inadequate. Most common causes are too long, and too small wires which increase resistance and slow up electricity. Tests show such wiring boosts current costs 8 to 10 per cent, according to Delaware agricultural engineers.

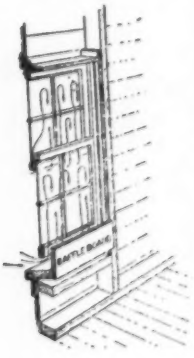
Why and How of Poultry House Ventilation

Condensed From Poultry Tribune

A. M. Goodman

Cornell University

EVERY poultryman wants to keep his house dry. Some interesting and promising work has been done along the line of condensing excess moisture from the air of the poultry house.



Up to now, however, ventilation, or the changing of the air, seems to be the most practical means of getting the desired conditions. So, let's take a good look at the problem from that angle. First, consider the sources of water. Some of it is spilled around the drinking places. Some of it is in the droppings. Much of it is in the breath of the birds. It is scarcely possible and certainly not practical to remove the water that is spilled at the fountains by ventilation. This water can be collected and removed by drainage.

Let us next put together some of the well known facts about air and moisture that have a bearing on ventilation. When air is warmed, it can hold more moisture than when it is cool. Air is warmed by heat and thus made thirsty. This thirsty air absorbs moisture.

What happens when air is cooled? We can get our answer by breathing on a cold window pane in winter. Moisture from our breath collects on the glass. When air is cooled it can't hold so much moisture as when it is warm, so it lets go of some of it. This is left on the window. Exactly the same thing happens when warm summer air comes in contact with a cold water pipe. We say the pipe sweats, but the water is dropped on it by the air that has been cooled by the pipe.

If we are to get the moisture of the birds breath out of the house by ventilation, the air must be kept warm enough to prevent condensation. The air then must

Reprinted by permission from Poultry Tribune
Mount Morris, Illinois

be so moved that it will carry the moisture out of the building.

The moisture of the droppings must be evaporated if it is to be taken out by the moving air. Heat is required to evaporate or vaporize water. Merely moving the air will not do much good without some heat. There must be enough heat available to vaporize the moisture from the droppings, as well as to keep the air warm enough to prevent condensation of breath moisture.

Some poultrymen use a little heat from a stove or furnace and find that savings on litter and cleaning more than pays for the fuel.

The birds produce considerable heat. This may be wasted through thin or poorly constructed walls and ceilings, or much of it may be kept in by insulation and utilized to keep the moisture in the form of vapor so that it can be removed by ventilation.

Insulation represents a single capital investment. Over a period of years it usually costs less than fuel and the labor for attending to the heater. It is cheaper than the cost of labor for extra cleaning and extra litter. These costs must be met constantly.

Just how thick the wall insulation needs to be for most economical results depends on the location and size of the building. In some of the northeastern states there are houses in which the spaces between the wall studs are filled with dry shavings. These have given excellent results.

A lot of heat is lost through ceilings that are not insulated. This tends to leave the pen unduly cold and results in the depositing of moisture on ceiling, walls and litter. The equivalent of three inches of mineral wool, four inches of dry wood shavings, or other fill type insulation is recommended for the northeastern states for the ceilings of pens that are next to the roof. Ceiling insulation has the added value of keeping these pens cooler in summer.

Birds breathe continuously and produce droppings regularly. Therefore, there should be a constant movement of air through the building to carry off the moisture produced.

How completely the moisture will be removed from day to day naturally depends much on the condition of the outside air. If the air is very damp, it will not, even after being warmed a few degrees, absorb as much moisture as if it originally contained less water.

Deep litter will absorb some moisture without becoming noticeably damp. Thus it helps in keeping conditions satisfactory by taking on some moisture during bad weather and giving it up when conditions are more favorable.

Enough air must pass through the house to carry out the moisture about as fast as it is produced. Greatly increasing the rate of air change tends to cool the house in winter. This naturally reduces the rate of evaporation and tends to defeat the purpose of ventilation.

Briefly, then, the requirements for keeping the house dry are removing spilled water by drainage; keeping the house warm enough to prevent condensation from the breath most of the time and to aid in evaporating moisture from the droppings; and moving air out of the house fast enough to carry away the moisture at about the rate it is produced.

By what means the air is exhausted is not important. Many poultry houses have flues for outlets; others have electric fans. If a flue is used, it must be tight and so built that there will be little loss of heat through its walls. Two thicknesses of seasoned, matched boards with paper between are recommended. As to size of flue, a good rule of thumb is to provide one-half square inch of cross-sectional area for each square foot of pen floor. Thus, a pen 36x72 feet would require a flue 36x36 inches. Only one flue should be used in a pen, and it should be located near the middle of the room.

A fan should have a capacity for removing two-thirds of a cubic foot of air for each square foot of floor area. If the house is well insulated or is heated, the exhaust air should be taken out by flue or fan from near the floor. If, however, the temperature in the pen is about the same as that out of doors, less trouble may be expected if air is removed from the ceiling.

The outtake flue or fan is only part of the ventilation system. Definite inlets must be provided to admit air. These should direct the air so that it can not blow on the birds. An inlet opening, 60 square inches in area, for each 240 to 250 square feet of floor area makes a good arrangement.

Under a combination of naturally favorable conditions, little attention need be paid to ventilation. These conditions, however, are seldom found. To get satisfactory ventilation, it is usually necessary to understand and to apply the principles that make drying possible.

Chickens need twice as much water for their weight as beef cattle, hogs or sheep.

Eggs are high in vitamins A, B-1, B-2 and D. They also contain such necessary minerals as iron, phosphorus and calcium.

ANTIBIOTICS for Dairy Animals

Condensed From Farm Research

J. K. Loosli and R. G. Warner

ANTIBIOTICS are now widely used in commercially mixed feeds for poultry and swine. A number of milk replacements for dairy calves have also been fortified with certain of the antibiotics, and some of the calf starters now on the market contain antibiotics.

Experiments carried on during the past three years at the Cornell agricultural experiment station permit an answer to some of the questions as to the value of antibiotics for dairy animals.

These studies have shown that calves receiving antibiotics tend to grow more rapidly and have less difficulty from scours and digestive disturbances than do control calves not fed antibiotics. Of the first 40 pairs of dairy calves used in these tests, one on the control ration died, but there were no losses among calves fed aureomycin. As an average, the calves on the antibiotic gained 22 per cent more rapidly during the first eight weeks than did the controls. The control calves scoured an average of 10 days during this eight week period, whereas calves receiving antibiotics scoured only four days. During the first two months the calves were allowed hay and a calf starter free-choice. Under these conditions the calves receiving antibiotics consumed 30 per cent more of the starter than did the control calves, but there was no difference in the intake of hay. The antibiotic feeding reduced the feed required to make a unit of gain by approximately nine per cent.

In many of the popular articles, the beneficial effects of antibiotics have been greatly overstated. As seen in the Ithaca studies, the use of antibiotics did not prevent all of the cases of scours, although it did tend to decrease both the incidence and severity of scours. In most of the experiments, calves were started by pairs and allotted by chance to the different treatments. As an average for the several experiments, the beneficial effects from antibiotics were definite. However, in some of the pairs of calves in each study there was no difference between the control animals and those receiving antibiotics, either in rate of

Reprinted from Farm Research, Ithaca, New York

gain, incidence of scours, or general appearance. It appears that antibiotics may tend to decrease the number of unthrifty animals, and permit all calves to do about as well as those that respond in a normal manner. Even with the use of antibiotics, it remains important to maintain sanitation, to follow good feeding and management procedures, and to avoid overfeeding, in order to prevent troubles and reduce losses.

Aureomycin has been studied most extensively and has been generally found to stimulate growth. In tests at Arkansas *terramycin* has given favorable results. *Penicillin* was beneficial in Cornell experiments. Other antibiotics have not been tested sufficiently to permit evaluation. Likewise, the published data are inadequate to allow an accurate statement of the desirable dosage. In general, however, as little as 10 to 30 mg per pound of dry feed have given responses with calves.

Because of the possibility of the accidental or intentional feeding of antibiotics to cows it is important to know to what extent these antibiotics will (1) affect milk production, (2) alter feed consumption, and (3) be transmitted into the milk.

Enough experiments have been conducted at Cornell to allay many fears as to the dangers involved. Six cows receiving 100 mg daily of aureomycin produced essentially the same amount of four per cent fat-corrected milk as they did during periods of no antibiotic supplementation. This antibiotic level corresponded to about 17 ppm of the grain ration or within the range of that supplied in swine feeds. No deleterious effects were observed on feed consumption during these periods.

As much as 700 mg of aureomycin in a feeding supplement (Aurofac 2A) was fed in the grain for a period of 10 days, with no appreciable change in feed consumption. Attempts to increase the intake to 1,000 mg resulted in grain refusals, while intakes of hay and silage remained unchanged. It appeared that this amount of the feeding supplement (62.5 gm in nine pounds of feed) was decidedly unpalatable. This level is about six times that normally found in commercial feeds.

No aureomycin has been found in the milk of cows that had received 700 mg per day for a period of 10 days. Likewise, cheese starter activity was not depressed in the milk of cows fed 500 mg of aureomycin per day for six weeks.

From these studies it appears that there is relatively little danger of hurting either the cows or the milk by accidentally feeding commercial feeds containing aureomycin.

RESCUEGRASS

For the Southeast

Condensed From Soil Conservation

B. H. Hendrickson

Soil Conservation Service

OVER a century ago, a Mr. Iverson of Columbus, Georgia, tried to interest other Georgians in a grass that he named rescue, because it started growth in the fall after summer grasses became tough and wiry. In his pasture, rescuegrass provided some winter grazing, went to seed in late spring, reseeded itself, and maintained itself.

That was long before the day of commercial fertilizer. And since this grass likes good land, and will not grow well on poor soil, Iverson's efforts brought little or no response. The grass never became popular, and it seems to have been forgotten or overlooked for about 100 years. The scientific name for rescuegrass — a brome—is *Bromus catharticus.*

About 10 years ago, the Soil Conservation Service made observational plantings of this grass at some of its nurseries. The plants were well fertilized. Results were so outstanding that seed was harvested and distributed to soil conservation districts for observational plantings on farms. Here the grass was confronted by a variety of conditions. Several farmers sowed seed on kudzu in the fall. Results were good.

In the fall of 1948, we planted rescuegrass on old stands of kudzu that were grazed down in the fall. We got only a thin stand the first year, but the grass thickened to a full stand the second fall. It was about six inches high and ready to be grazed by the first of November.

Since then we have had both kudzu and rescuegrass for grazing from July through October. Many of the old rescuegrass plants lived through the summer in the partial shade of the kudzu. From November until mid-April we had rescuegrass grazing while kudzu was dormant. We closed the pasture from mid-April to about the middle of the summer to let the kudzu stand recover.

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Washington, D. C.

We still need a lot of information about this plant combination. We already know that the grass, which is a short lived perennial in north Georgia and usually a reseeding annual in the Coastal Plain, will survive in a stand of kudzu that is grazed in the fall. We know that rescuegrass is palatable and that stock like it. And like the other bromegrasses, it is nutritious.

We still lack sufficient knowledge on how to manage kudzu in combination with rescuegrass, and on what fertilizer treatment to use and when to apply it. It is common practice to fertilize in the fall to stimulate the growth of winter grass. Grass that grows in winter draws rather heavily on mineral nutrients that are essential to the satisfactory growth of kudzu. Will liberal fall applications of fertilizer take care of the needs of both cool season grass and warm season legume? Or must we fertilize in the spring for the legume?

We also need to know more about grazing management. The vigorous growth of grass that we've been getting in the winter was due to the effect of the kudzu. We don't want to graze the kudzu out and thus effect a double damage.

Our experience shows that this definitely is not a year round pasture. Where we grazed kudzu in the spring or overgrazed it in the summer, ragweed came in and required summer mowing. It is possible that more liberal fertilization would have increased the vigor of kudzu plants to such an extent that grazing would have been less damaging.

Rescuegrass has been grown in combination with sericea in much the same way as with kudzu. It has grown in mixtures with reseeding crimson clover and other annual winter legumes. And it has grown successfully with alfalfa and Ladino clover.

Rescuegrass grows in tufts and is leafy at the base. It looks a good deal like oats. It grows two to three feet tall and has slender seed stalks that often bend down under the weight of the seeds. Seed heads resemble oats, except that they have a flattened appearance. Seeds are nearly as large as oats, but weigh only about half as much per bushel. The grass is a heavy seed producer, and in 1951 we harvested two seed crops on the same land—the first late in May and the second in July.

Mildew and smut are the most common diseases, and they are serious on most strains. The strain from Soil Conservation Service nurseries has been one of the better kinds at Watkinsville experiment station in Georgia. It certainly was one of those most nearly free from disease.

Rescuegrass may be sown on kudzu in the fall and pushed into

the soil by the feet of grazing animals. It can be established in this manner even on rough, gullied land. About 25 pounds of seed per acre has given good stands. Somewhat lighter rates are sometimes sown on kudzu by farmers to get enough plants the first year for a light seed crop from which a thick volunteer stand comes the following fall. When seed becomes more plentiful, the heavier rate of seeding probably will be more common.

We have disked down kudzu in the fall and drilled the grass seed. Severe fall disking of kudzu may result in injury from cold. Kudzu will stand more disking in the spring than it will in the fall.

Rescuegrass seed is very light. We have mixed about five pounds of grass seed with each 100 pounds of complete fertilizer of 4-8-6 analysis and drilled 500 pounds per acre, with the drill set for 600 pounds. We planted immediately after mixing, so as to avoid seed injury. In the spring the grass was top-dressed with 100 pounds per acre of ammonium nitrate.

We have harvested as much as 500 to 800 pounds of rescuegrass seed per acre the year following fall seeding. These plantings were made on good seedbeds on cropland that was in moderately productive condition.

Within a few years there should be ample supplies of seed available from healthy strains, as rescuegrass is a prolific producer of seed of good quality.

Limestone May Be Most Valuable Soil Improvement

Limestone may still make more money for you than any fertilizer you can buy. A. L. Lang, University of Illinois soils man, says that in the average rotation crops and leaching losses take about 500 pounds of limestone an acre a year. On that basis most fields will need two tons about every six to eight years. Some fields need four to five tons an acre to build up the lime needs to begin with.

Four tons of limestone on an experiment field between 1948 and 1951 increased corn yields from 27 to 53 bushels, soybean yields from 15 to 21 bushels, wheat from 4 to 11 bushels, and hay yields from 400 to 2,600 pounds.

When phosphate and potassium were used in addition to limestone, corn during the same period produced 82 bushels, soybeans 29 bushels and wheat 18 bushels, and the hay yield was more than two tons.

Plantings with phosphate and potassium but no lime gave only 37 bushels of corn, 17 of soybeans, five of wheat and less than half a ton of hay.

Saving Sweat in the Silo

Condensed From New Jersey Farm and Garden

Samuel H. Reck, Jr.

THREE years of trial and error, coupled with plenty of energy and resourcefulness, have brought D. W. Ruedemann and associates of Plainsboro, New Jersey, to a point where they can give you many of the answers to the self-feeding silo problem.

During those years they have fed out 10 silos, each one with a different self-feeding arrangement —each with some improvement designed to achieve better control of silage. On the basis of their experience, Mr. Ruedemann offers the following observations:

1. Self-feeders for grass silage or corn silage must be controlled and operated, just like any other machine or tool on the farm. This goes for self-feeders for hay, too. You can't open up a self-feeding silo and expect it to operate satisfactorily without attention.

2. Corn silage will feed freely in a properly constructed self-feeder silo. Finely cut corn silage is likely to feed too freely, flowing out like grain, unless controlled. Self-feeding corn silage will save from 75 to 90 per cent of the manual labor required with conventional silos.

3. Self-feeding of legumes such as alfalfa, clover or soybeans from a silo will probably work best when the silage is cut fine, and may eliminate up to 75 per cent of the manual labor.

4. The grasses—orchard, brome red top, timothy, etc.—when cut young and fine will feed about like the legumes. When cut mature it is difficult to field cut fine enough and the silage binds. It becomes so hard under the compressive load of the mass above it that it won't break apart. In such cases it is necessary to break the grass loose with some mechanical means. Mr. Ruedemann's foreman, J. H. Bennetch, saws it out with a 24 inch chain saw, but since the saw is not constructed for this kind of work it must be sharpened and set often. They have purchased a new field chopper capable of cutting the grass finer, and believe it will make it easier to break the silage loose, eliminating much of the chain sawing.

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Sea Isle City, New Jersey

5. Fifty to sixty head of cattle will get enough silage from a 14 foot diameter self-feeder silo, provided they have access day and night. Mr. Ruedemann feeds 90 to 130 head of dry cows and bred heifers in one group and always has two 14 foot silos open, together with self-feeding hay racks, 24 hours a day, on a loafing barn program. He puts up seven tons of silage and three quarters ton of hay per animal for about six months of winter feeding. No grain is fed, except what he uses as a preservative in the grass silage.

6. Mr. Ruedemann and fellow workers have found that if corn silage, grass silage, and hay are available, the cows pass up the grass silage. "We have yet to learn to make grass silage as palatable as corn silage," he declares. "This year we have added 400 pounds of corn and cob meal per green ton. Last year we used no preservative and the cattle showed a preference for other feeds. They would go to the grass silage, however, if shut out from the corn silage."

7. Mr. Ruedemann's concrete stave silos are constructed with wind tight flat concrete roofs. Spoilage, top and bottom, has been slight. He has refilled a silo before it was empty and reports that the spoilage between layers was nil.

In this climate, freezing is not a problem.

9. "At this time," observes Mr. Ruedemann, "I would not recommend self-feeding silage to everyone. If you are building a new silo or rebuilding, then pipeline milkers, loafing barns, and self-feeding should be in your program."

10. "Operating a self-feeding cylindrical silo requires experience and good common sense," he points out. "As good as they are, and useful to the dairy farmer, neither the milking machine nor the barn cleaner are labor free. Any machine or tool is only as good as the operator. Good operators are becoming more scarce as we become more industrialized."

Charles H. Reed, Rutgers agricultural engineer, has worked closely with Mr. Ruedemann. For self-feeding corn silage satisfactorily, Mr. Reed recommends a standard 14 foot silo elevated on 12 five-foot columns. A cone five feet high, with a base diameter two to five feet less than the diameter of the silo, is placed in the bottom of the structure. Adjustable panels and feeder gates are used to control the feeding action of the cattle and the movement of the forage.

However, as pointed out above, silage made from grasses and legumes will not flow or break over the cone. Placing knives on top of the cone to cut the silage

as it squeezes down has been tried, but the great pressure of the silage bends the knives out of shape. To solve this in his four silos Mr. Ruedemann has replaced the cones with 11 radial concrete partitions, six to eight inches wide and two to three feet high. Silage is held up on these partitions to better control the flow and make the grass more accessible to the cattle.

Light Doesn't Help Pigs

Because artificial night lighting leads chicken and turkey hens to eat more and lay better, some farmers have thought they might boost the growth of pigs the same way and even claimed they've done it. But USDA specialists tried the plan, winter and summer, with two lots of pigs with lights, and two lots without. They report that night lighting made no appreciable change in the feeding habits or in total feeding time of the pigs. With self-feeders lighted all night, the pigs ate no more, gained no more and no faster than the pigs in the natural daylight and darkness. Pigs with night lights did seem to take slightly more snacks between midnight and morning, but the unlighted pigs were also up and eating at times during the dark hours. As hog growers well know, pigs often feed in the dark.

Correct Feed Timing Helps Milk Quality

One of the most frequent causes for the lack of quality in milk is feeding cows before they have been milked rather than afterward.

E. K. McKellar, Colorado A. & M. experiment station, says experiments show that objectionable feed flavors are imparted to milk when cows are fed two hours before milking. This is especially true of silage.

In summer when cows are allowed on pasture up to milking time, a high percentage of the milk at this time of year can be criticized for being "feedy." Removing the herd from pasture three to four hours before milking will eliminate much of the feed flavor. In winter, feeding of hay is easily arranged so that little, if any, hay is eaten by cows for four hours prior to milking.

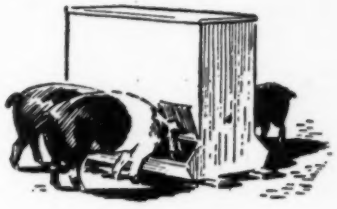
It is especially important, McKellar said, that strongly flavored feed stuffs such as beet tops or pulp, weedy forage and the legumes be fed eight hours before milking time. This can be done best immediately after one milking so these feeds will not affect the milk at the next milking time.

Other factors in producing quality milk include having the barn clean and well ventilated, cows well bedded, the use of sanitary equipment and prompt milk cooling.

Income From Hogs Depends on Good Breeding,

Good Feeding and Good Management

HOW TO PROFIT WITH HOGS



Condensed From Hog Breeder

E. C. Miller

Purdue University

MANY cornbelt farmers have found that the most profitable way to market their bumper corn crops is by feeding it to hogs. In Indiana, for instance, the sale of seven to eight million head of hogs annually furnishes approximately one-third of the farm income.

Efficiency of production is the important factor affecting profits from the hog enterprise. Efficiency depends upon a combination of good breeding, feeding and management practices. If a farmer fails in any one of these three he can expect disappointing results. It is the purpose of this article to point out some of the proven practices which are being used today on our most profitable Indiana hog farms.

Selection of Breeding Stock

Most consumers today are showing a preference for smaller cuts and leaner type of meat. This is putting emphasis on a hog which will cut out a high proportion of quality lean meat with a minimum of fat. A desirable meat-type hog has a long, deep body, is broad over the loin, has a full deep ham and is trim about the jowl, shoulder and underline.

By careful selection, the above type of hog can be found in all the existing breeds of swine. No one breed is superior to all others.

There is wide variation in the production ability of brood sows. Size of litter, nursing ability, weight of pig, and gaining ability are inherited characteristics which are transmitted from parent to offspring. There are sows in every breed that have proved their ability to farrow and raise large litters of growthy pigs. Se-

Reprinted by permission from Hog Breeder
Chicago, Illinois

lect gilts and boars from these proven sows.

There is a positive correlation between weaning weights and market weight of hogs. The pig that is heaviest at weaning time will usually get to market the quickest. Therefore, weaning weights are a reliable guide to use in the selection of hogs which will gain rapidly.

Select gilts from litters where eight or more vigorous pigs were raised. Their dams should be gentle and good sucklers. The gilt should be of medium type, deep and wide in body, and with enough length to have at least six well spaced teats on a side.

Use only purebred boars. Good breeding pays. He should be masculine, deep and wide in body, and full between front legs. His feet should be straight, pasterns short, and the bones larger than those of sows or gilts. He should be from a large litter of rapidly maturing pigs. Gilts which he sires are more apt to have good teat development if he has 10 or 12 well spaced rudimentary teats.

Breeding Practices

Gilts should be well developed and bred not younger than 8 months of age. They should weigh at least 225 pounds. Breeding gilts too young may result in small litters, weak pigs and stunted growth of the gilt.

Young herd boars should be at least 8 or 9 months old and weigh 250 pounds before they are used for service. Best records have been made by farmers using yearling or mature boars. However, it is often necessary to use a breeding crate for heavy mature boars. A bail of straw placed on each side and in front of the sow may help serve the purpose of a breeding crate.

Sows usually come in heat every 19 to 21 days unless they are pregnant or suckling a litter. This is called the estrual cycle. The average length of the heat period is from two to three days. Sows will usually remain in heat from 12 to 15 hours longer than gilts. It is best to breed the sow on the second day of heat. If she is still in heat on the third day, breed her again. There is evidence that this practice will improve litter size.

Most farmers practice the two litter system of raising hogs. When suitable housing is available, spring pigs should be farrowed during February and March. Early farrowed pigs can be marketed during the fall peak price period. Fall litters should be farrowed during August and September. This gives the pigs time to get a good start before winter.

After the sow has been bred, place her in a pen by herself until heat has passed. When swine producers are farming on a large scale, pasture breeding is often practical from the stand-

point of time and labor.

The boar must be kept active, in good health, and in proper condition if he is to do a good job of breeding sows. Over-fatness has ruined many good boars. Boars need exercise, sunlight, legume pasture and a balanced ration, the same as other breeding animals on the farm.

Confine the boar in a lot away from the sows to prevent ranting. Make sure he has room to exercise and get plenty of green pasture. During the off-season, keep him in thin to medium flesh. Have the boar on a balanced ration and in gaining condition three weeks prior to the breeding season. This is important because boars will often go off-feed during breeding season.

The physical condition of the sow at breeding time is important. She should be in thin to medium flesh, not fat. During the brief period between the time a sow weans a litter of pigs and she is bred again, her ration should be increased to bring about a gaining condition. Sows which are gaining rapidly at breeding time are more likely to settle on first service and produce a large litter. A sow can partially build up her body reserve of minerals and vitamins during this period.

Feed Nutrients

Cereal grains are the chief source of energy for growth and fattening of livestock. They are very palatable, highly digestible, and with the exception of oats are low in fiber. While grains are an excellent fattening feed, they are very poor growing feeds because they are seriously deficient in minerals, particularly calcium. Therefore, protein and mineral supplements must be fed to balance the ration.

Corn serves as the basis for practically all rations fed to hogs. It is excelled only by wheat as a fattening feed. Corn should be cracked for pigs until they reach a weight of 50 to 75 pounds in order that protein supplement and other ground feeds can be mixed with it. Grinding corn for hogs over 75 pounds seldom pays except possibly in the case of artificially dried corn. Ear corn can be fed satisfactorily on feeding floors and on solid ground where waste will not occur.

Wheat has about five per cent more feeding value than corn. However, it is usually too expensive to substitute for corn. Hogs fed wheat put on a firm finish and require slightly less protein supplement than those fed corn. If wheat is fed, it should be coarsely cracked. Small pigs up to 75 pounds in weight should be given first preference for any wheat available for feeding purposes.

Oats contain too much fiber and are too bulky to be used satisfactorily as the main concen-

trate in hog rations. However, when limited to 25 per cent of the pig ration they are worth about as much as corn, pound for pound.

Protein is the basis of every living cell in the animal's body. The protein found in corn and other grains is deficient in some of the amino acids. Therefore, poor gains result when grains are fed alone. Feeds such as soybean oil meal, meat scraps, fish meal, linseed meal, and milk products are rich sources of the amino acids. Feeding trials have shown that faster and cheaper gains can be made by combining these high protein feeds.

Efficient swine production depends upon an adequate supply of vitamins in the ration. This is particularly true during the gestation period and for pigs up to 100 pounds in weight. Our best natural source of vitamins is lush green pasture. Therefore, it is important to provide as near a year around pasture program as possible.

The best substitute we have for green pasture is dehydrated alfalfa meal. It should be bright green in color and have at least 17 per cent protein. The winter fattening ration should have 10 per cent alfalfa meal in the protein supplement. Alfalfa meal should make up at least 15 per cent by weight of the total brood sow ration under dry lot conditions.

Second or third cutting alfalfa hay can be ground satisfactorily and used in place of dehydrated alfalfa meal. Use bright leafy hay which has not been stored over one year, as hay loses its carotene (vitamin A) content in storage.

When hogs are fed indoors and do not have access to suinshine, they should receive one-fourth pound of irradiated yeast per ton of feed to furnish vitamin D.

One of the greatest discoveries in the field of animal nutrition in recent years is APF (animal protein factor). In addition to vitamin B-12, most of the APF supplements on the market contain certain antibiotics, such as aureomycin, streptomycin and terromycin. Recent research has indicated that these antibiotics are as important in promoting growth as the vitamins found in the APF supplement.

There are 13 minerals which are known to be essential for growth and health in hogs. The mineral needed in largest quantities is calcium. Hogs of all ages should have free access to minerals, for our natural feeds are deficient in them.

Water is the most important nutrient required by hogs, yet it is very often neglected. An automatic waterer attached to a pressure system or a self-watering device in a tank are the most de-

pendable methods of watering hogs.

The Gestation Period

Feeding the unborn pig is the most important nutrition problem that confronts the swine producer. The size of pigs, their strength and vigor at birth, and their livability, depend largely upon the proper feeding of the sow during the gestation period. Unless the sow is properly fed, heavy death losses will occur in pigs the first week after farrowing, regardless of the care given them. Pasture is an excellent source of essential vitamins, minerals and proteins.

Ladino clover, alfalfa, red clover, lespedeza and bluegrass are all good summer pastures for brood sows. Balbo rye seeded in August makes a good winter and early spring pasture for brood sows. Winter barley, rye grass and winter oats are suitable for some sections.

A sow or gilt should gain 75 to 100 pounds during the gestation period. A 250 pound gilt will require about four to five pounds of feed per day, and a 500 pound sow will require about six to seven pounds. If the protein supplement is fed separately, sows should receive one-half to two-thirds pound per day, and gilts two-thirds to three-fourths pound.

More and more farmers are self-feeding sows during the gestation period because it saves time and labor. Self-feeding gives even the timid sow a chance to get her share of the ration. However, it increases the feed cost and is harder to keep sows in the proper condition.

Various methods have been devised to force sows to take exercise during the winter months. The common method is to place the shelter 20 to 30 rods from the source of feed. Another method is to sow a winter pasture crop such as Balbo rye, winter barley or rye grass in one of the back fields away from the buildings. The desire for green roughage will usually lure the sows regardless of weather conditions.

Pigs are born about 112 to 115 days after the sow is bred. Thoroughly clean the farrowing quarters prior to the farrowing season. Heat is necessary to kill round worm eggs. Custom steam cleaners are excellent for cleaning and disinfecting. The house can also be scrubbed with boiling water and lye (one pound of lye to 20 gallons of water).

After cleaning, move the individual hog house to clean ground where no hogs have been for at least a year. Bed the house with ground corn cobs, chopped wheat straw or shavings. Too much bedding makes it difficult for the new born pigs to get up to the udder to nurse.

A panel placed across one corner of the house in winter time will protect the pigs from being

over-laid. Hang a heat lamp or flood lamp in the corner to furnish heat and light to attract the pigs. In summer, guard rails should be installed.

It is a good practice to wash the sow to remove filth and worm eggs. Move the sow to the farrowing pen about two or three days before she is due to farrow. Sows will usually farrow within 24 hours after milk appears in the udder.

It is usually time well spent to be with the sow when she farrows. Keep dogs and other animals away. The pigs should be dried off with a sack or cloth to prevent chilling. Be sure that all new born pigs find a teat and begin nursing soon after farrowing.

Remove the afterbirth and put in clean dry bedding after the sow has finished farrowing. Do not expose the sows and pigs to cold drafts and rain.

If several sows farrow within a 48 hour period, it is a good practice to transfer pigs so that all the litters have about the same number of pigs.

Weigh and ear-notch the pigs at farrowing time. Save gilts and boars from litters which average three pounds or more per pig at birth. The black "needle" teeth should be removed to prevent lacerating the sow's udder and wounding other pigs. A pair of electrician's sidecutter pliers is a good tool for this job.

The sow should be hand fed the last two weeks before farrowing. High energy feeds such as corn and wheat should be reduced to a minimum. The first 24 hours after farrowing the sow should receive nothing but fresh water. Start feeding again on the second day. The quantity of feed should be increased gradually until the sow is on full feed in 10 days.

It is very important that pigs get out on clean ground within a week or 10 days after farrowing to prevent anemia.

Anemia is caused by a lack of iron and copper in the baby pig's diet. It is most likely to develop in suckling pigs which are kept indoors on cement or board floors and receive nothing but their mother's milk.

As a rule, the fattest, most rapid growing pigs become anemic the quickest. The pigs lack vigor and soon develop a wrinkled skin and a rough hair coat. The disease is often referred to as "thumps" because the pigs show a labored, jerky breathing when made to exert themselves.

During the winter and early spring months when the weather is so cold and stormy that the baby pigs cannot be moved out of doors, one of the following preventive measures against anemia should be started on the third or fourth day:

1. Place a piece of bluegrass sod in the pen for the pigs to

eat. Get the sod from areas where no hogs have been for at least a year to avoid round worm contamination. It is a good practice to sprinkle the sod with copperas solution.

2. Paint the sow's udder with a copper (ferrous sulphate) solution. Prepare the solution by dissolving one-half pound of the ferrous sulphate crystals in two quarts of warm water. Two or three tablespoons of molasses added to the mixture will cause the solution to stick to the udder.

3. Start the pigs to eating grain at the earliest possible date.

The Lactation Period

Lactating sows and gilts require about three pounds of feed daily for each hundred pounds of live weight. A creep should be built so the baby pigs can eat without being molested by the sows.

Male pigs should be castrated when they are two to four weeks old. At this age, there is very little shock and loss of blood.

The only permanent safeguard against hog cholera is to vaccinate with serum and virus. Treat the pigs when they are six to eight weeks old and are still nursing the sow. The cost of treatment is less at this early age and shock is not as severe.

Pigs should be weaned at eight or nine weeks of age. It is best to move the sows and leave the pigs in the same field to which they are accustomed. Caked udders can be prevented by reducing the feed of the sows two or three days before weaning.

Weaning time is a very critical period in the pig's life. Very often pigs will become unthrifty and lose their bloom at weaning unless the protein content of the ration is increased. This is necessary to replace the protein which the pigs were getting from the sow's milk.

The protein consumption can be increased by feeding protein supplement free choice in a self-feeder in addition to that being fed in the ground mixture. The three or four weeks period immediately following weaning is also a good time to feed milk products which are high in protein.

The per cent of protein required in the swine ration decreases as the animal matures. It is important that the pig receive a full allowance of protein until it reaches a weight of 100 pounds. Fattening hogs will make more rapid gains and finish more uniformly when protein supplement is fed throughout the fattening period. However, hogs weighing over 100 pounds will make satisfactory gains on Ladino clover pasture, a full feed of corn, and minerals. Pigs from weaning to market age are food wise and will balance their ration of grain and supplement when they are

fed free choice.

Growth and Fattening Period

Results of many experiments show that the fastest and most economical gains are made by hogs which are full fed throughout the fattening period. Full feeding also shortens the time of getting pigs ready for market. It reduces labor and makes it possible to hit the high markets with March and September farrowed pigs.

Good pasture will save from 5 to 10 per cent of the grain and 30 to 40 per cent of the protein supplement required by growing and fattening hogs. Good pasture also promotes health in pigs by furnishing essential vitamins, minerals, proteins and other nutrients.

An acre of good legume pasture will carry 20 hogs which are full fed grain and supplement from weaning to market.

Complete feed records were kept on a group of sows and litters to determine feed requirements from breeding to marketing. The table below shows the amount of food required per pig during different stages.

FEED REQUIRED TO PRODUCE A 225 POUND MARKET HOG

(ON ALFALFA PASTURE)

Stage	Grain Lbs.	Protein Supple. Lbs.	Minerals Lbs.	Total Feed Lbs.	Feed For 100 Lbs. of Gain
Sow (gestation)	754	40	3	797	
Farrowing to weaning (sow and 8 pigs)	763	85	7	855	
TOTAL	1,517	125	10	1,652	
Breeding to weaning (per pig	190	16	2	208	
30 to 75 lbs.	114	20	1	135	295
75 to 150 lbs.	220	26	1	247	325
150 to 225 lbs.	264	24	1	289	381
TOTAL FEED PER PIG	788	86	5	879	
225 to 300 lbs.	297	17	1	315	427

Insurance for Farmers

Fire . . . Windstorm . . . Liability

Condensed From USDA Farmer's Bulletin No. 2016

Ralph R. Botts, Agricultural Economist

A RISK is a chance of financial loss. One man alone cannot well hedge against all risks and perils, because they cannot be predicted as well for one person as for a group. Insurance is a way by which the losses that fall heavily upon the few may be shared by many.

Most farmers probably have some savings to tide them over in case of illness. Or, with the help of the family, or relatives, or neighbors, they may be able to continue selling milk or eggs for income. If so, they have less need for accident or disability-income insurance than most city people do. Many farmers rent their farms when they are too old to work, and then live off the rent. Others sell their farms and either live off the proceeds or buy annuities with the money. Usually a farmer has "plowed back" most of his profits into his farm so the farm often represents his life's savings. If he owns it outright he has less need for buying endowment life insurance.

On the other hand, any farmer (or in the case of his death, his dependents) is likely to suffer a severe set-back in case of *fire, windstorm* (particularly in some areas), or an *adverse court judgment* resulting from injury to an employee or from an automobile accident, or from *death.* So these hazards may be considered the main ones which farmers should certainly insure against.

Fire and Windstorm Insurance

The fire insurance policy is probably the most important contract in the world today. At one time companies did not try to use the same language in their contracts, but now a standard policy is used in most states. This policy gives protection against fire and lightning, and most companies, if paid to, will extend it to cover other hazards. They do this by a supplementary agreement, called an endorsement or "rider," which is attached to the policy.

The most common rider is known as the "extended coverage" endorsement. It provides insurance against damage from vehicles, explosion, riot, smoke, aircraft. Usually it includes *windstorm* and *hail damage* in the case

of city property, and some companies include these in the case of farm property except crops (for which separate insurance is necessary). It is always for the same amount as mentioned in the policy. Of course, there is an extra charge for this rider, something like half of what the fire policy costs. A few assessment companies operated by farmers include windstorm damage along with fire and lightning, in which case no separate payment is charged.

Most commercial companies will insure against windstorm (and hail) damage to farm property, other than crops, separately from any fire insurance. The rate for it is usually about 90 or 95 per cent of what would be charged for "extended coverage" against all seven of the hazards mentioned in the paragraph above. The reason for this is that the other five hazards do not strike often and most insurance payments under seven point extended coverage are made because of loss from their windstorm or hail.

Another common endorsement covers the household contents when the dwelling has already been insured by the same company. Another is the permit which allows the insured family to be away from the insured property longer than the time specified in the policy. Any small changes in the contract—for example, extending the term of insurance from one to three years by paying the difference in premium would also be handled by an endorsement to the policy.

Fire insurance premiums or assessments may be paid yearly. But if the premiums are paid in advance, most commercial companies will give five years of insurance for four times the yearly cost, or three years for the price of two and a half years. In a few states the savings may be more than this. In practically all states, the larger companies allow premiums on a five year policy to be paid by installment notes.

Farmer's Mutual Fire and Windstorm Insurance Companies

About 1,850 so-called farmer's mutual fire insurance companies in the United States offer relatively low cost fire insurance on farm property. Most of these are in the northern half of the country. About a fifth of them also offer windstorm insurance. These mutuals are usually local—often doing business in only one or two counties. Practically all of them inspect properties before they accept them for insurance, so their loss per $100 of insurance are usually rather low. Applications for insurance are often accepted by district directors, who may serve without salary, and who generally make the first inspections as well as an inspection be-

fore any loss is settled. The salaries of those who work in the office are usually modest. These facts probably explain why the average expenses of the farm mutuals per $100 of insurance are unusually low and why their insurance is so reasonably priced.

These companies are assessment mutuals. This means that, if necessary, members can be assessed an extra amount to meet unusual losses in any year. But most of them have built up strong reserves by charging somewhat more than costs, and these reserves are used instead of extra assessments. For instance, about a fourth of them made no assessments in 1946.

Windstorm insurance can be obtained in some states from mutual companies that write only against windstorm.

Paying Insurance for Losses

Most companies — whether stock, general writing mutual, or farm mutual—pay all losses up to the amount mentioned in the policy. When there is a fire or a windstorm, a good farmer protects his property from further damage as well as he can, and then notifies his company—usually by telephone. The company will ask him to give a "proof of loss" or statement in regard to the damages within a certain number of days.

These are the things that may keep a farmer from getting full payment in case of claim for fire damage:

1. If the property has been vacant beyond a specified period—usually 60 days.

2. If the risk has been increased, as by storing gasoline in the basement or running a stovepipe through a partition without notifying the company, or by running a corn drier without a permit from the company.

3. If he has taken out additional insurance without notifying the first company.

4. In some cases, if the title to the property has been changed or a mortgage has been placed on it without notifying the company.

In all forms of property insurance, the company is allowed to pay the claim at the actual value of the property; that is, not to be more than it would cost to repair or replace it, taking the depreciation into account. But the payment is not to be more than the amount stated in the policy.

Rates

Commercial rates for fire and windstorm insurance depend on the usage made of the building (whether dwelling or barn) and the roof covering (combustibility, in the case of fire insurance; and wind resistive qualities, in the case of windstorm insurance). Rates for dwellings depend also on wall construction (frame, brick, etc.), which is the principal or only thing considered in the case of a

silo. Dwelling contents ordinarily take the dwelling rate, while barn contents usually take the barn rate. If a barn and its contents are valued at $2,000, and $1,500 worth of insurance is placed on them, at the rate of 50c per $100, the yearly premium to be paid by the farmer will be $7.50.

Most of the farm mutuals charge all members at the same rate, regardless of the classes of property insured. But in recent years classified rates, which more nearly measure the probabilities of loss, have been used more and more. This can make the rates more fair. As an example, through classified rates a farmer who has gone to extra expense in using fire resistive materials in building or who has installed lightning rods or other fire equipment receives some money reward for it. Farm mutuals usually write their insurance for five (sometimes three) years, but assessments for paying losses are usually levied each year that they are necessary. Such companies usually do not have to submit their rates for approval by the state insurance commissioner.

Liability Insurance

Liability insurance pays any court judgment (up to the limits of a policy) that might be obtained by someone else who sued a farmer because of an accident of the type covered by the policy. The possibility that a farmer might lose his farm or his life's savings to satisfy a judgment is a risk which should be insured against if it is possible to do so.

A man must be proved liable before a judgment can be rendered against him in court; but to defend himself in a suit is usually inconvenient and expensive. A person who has liability insurance will be defended in court by his company, and it will pay the costs of the defense and the court, and any judgment up to the amount stated in the liability policy.

Such policies now usually include medical payments to the injured party, regardless of who is responsible for the accident, and no extra yearly payment is charged for this. But there is extra cost if this provision is made in an automobile liability policy.

Auto and Truck Insurance

The main forms of automobile and truck insurance are (1) public liability and property damage insurance, which protects you if there is a damage suit because of injury to a person or damage to the property of others by an automobile or truck that is owned or driven by you, and (2) the insurance, which includes "comprehensive" and collision, under which you are reimbursed for damage to or theft of your own vehicle.

Public liability and property damage insurance in connection

with an automobile (and truck) are getting to be more and more necessary, to protect yourself against lawsuits and because of certain laws in most states which make the secretary of state or some other official your agent when you use the highways of the state. For instance, if you should be in an accident while in another state, it might be very costly and inconvenient for you to appear there if you were sued and had to defend yourself in court. A resident of that state, if injured by you, needs only to serve notice on his state official, who then gives you notice by registered mail to appear in your own defense. If you have liability insurance, the company will defend you, and will pay all costs even for your transportation if necessary, and any judgment that may be rendered up to the limits of your policy.

The three kinds of automobile liability insurance commonly sold are (1) bodily injury, (2) property damage, and (3) medical reimbursement. The first protects you financially if you or a member of your family injures someone else while driving your car or (usually) one lent to you by a friend. You would also be protected in case you were sued as a result of injury caused by your car or (usually) one lent to you by a friend. You would also be protected in case you were sued as a result of injury caused by your car while it was being driven by a friend to whom it had been loaned by you. The second protects you if, when driving your car, you cause someone else's property (including the automobile) to be damaged. The third is intended to reimburse the car driver for any medical, hospital, nursing or funeral expenses, paid by him as a result of an accident connected with his automobile. Payments are often made to others, even though the car owner, who has the insurance, is not responsible for the accident. The first two kinds, particularly the bodily injury liability insurance, are considered most necessary and do not cost as much as the insurance on his own car, which was mentioned earlier.

The property damage insurance usually cannot be obtained without the bodily injury coverage. But the latter usually can be, though seldom is, obtained without the former. The phrase "5/10/5" is often heard in connection with liability insurance. It means that the policy protects the insured person up to $5,000 in the case of injury to one person, or up to $10,000 in case of injury to two or more persons in one accident, and up to $5,000 property damage. The bodily injury limits can be increased by paying a small additional premium, and this action is usually recom-

mended.

The liability insurance is particularly necessary to safeguard your own property and assets and because of the laws about automobile responsibility in most states. In 18 states these laws require that the operator show evidence of financial responsibility *after* the first accident, for the sake of any future accidents. In another 25 states security is required in connection with an accident immediately after it happens, as well as for future accidents, so that insurance becomes almost necessary beforehand—for it could not be obtained afterward. In four states there are no automobile responsibility laws. In Massachusetts, automobile liability insurance is compulsory.

This evidence of financial responsibility is required in order to make sure that any court judgment against the operator of the automobile or truck will be paid. The courts appear to be rather kindly disposed toward injured people, and are likely to grant them damages. It has been reported that in 95 per cent of the court cases involving injury something is paid to the injured person.

"Medical reimbursement" insurance is intended to reimburse the car operator for any medical, hospital, nursing or funeral expenses paid by him because of accident in connection with the ownership and operation of an automobile. Payments are often made by the company directly to a third party, or the injured person, or a doctor. In most states the coverage has been broadened to include all passengers as well as the driver, regardless of who is responsible for the accident. The cost of this protection is usually about $3 or $4 a year for $500 worth of insurance. As the car owner, his family, and any passengers, are covered regardless of who is responsible for an accident, the protection is practically a "blanket" accident policy in connection with driving an automobile. It is popular with car owners.

Liability insurance on a tractor can be obtained either in a separate policy, or existing insurance on a car or truck can be extended to cover it at extra cost. Where a tractor is used a lot on the highway, insurance on it may be particularly desirable.

Other Liability Insurance

Although automobile and truck liability insurance is perhaps the most necessary "third party" insurance for the farmer, there are other kinds he may need or want. Casualty insurance companies, both stock and mutual, offer a *farmers' comprehensive personal liability policy*, which protects the farmer in case of lawsuits against him by the general public resulting from accidents in which he might be liable. For an extra

payment, the insurance can include liability in connection with the business activities of the farmer or to household employees. This personal liability policy protects a farmer against suit over injury caused by his dog or other animals, as well as personal acts of the farmer or members of his family while on or off the farm. Full time household employees are charged for at the rate of about $2.50 each per year. Usually a three year policy can be had at a cost of two and a half times the yearly premium. An employer's liability policy is needed to protect the farmer from lawsuits resulting from work accidents to hired help.

Medical reimbursement insurance is included at no extra cost in the farmers' comprehensive personal liability policy and in the employer's liability insurance, which is explained in the next paragraph.

Employer's liability insurance protects the employer in case of a suit by an employee who is injured while at work. From the standpoint of the farmer, such insurance provides protection about equal to that provided by workmen's compensation insurance, which is discussed next, except that it does not provide for payments to the injured employee. This employee must first prove negligence by, or the responsibility of, the farmer and be awarded a judgment against the farmer in court in order for the insurance company to pay him under the policy.

Workmen's compensation insurance assures the employee that he will receive certain "benefits" or payments set up by law, in case he is injured, if he agrees not to sue his employer. In this sense it protects the farmer against claims or court awards arising from injury to hired help, just as employer's liability insurance does. Yet workmen's compensation insurance generally costs no more than straight employer's liability insurance without the worker benefits. It is generally believed that this "double acting" protection is the best form of insurance for a farmer, as well as an industrial employer, since the question of who was negligent is not considered by insurance companies in making settlements.

Except under certain conditions in a few states, farmers are not required to take workmen's compensation insurance. They may wish to do so, however, in these and other states (but Alabama, West Virginia and Wyoming do not allow this). In five states (Nevada, North Dakota, Ohio, Oregon and Washington) the insurance may be obtained only from an insurance company that is operated by the state. In 11 other states (Arizona, California, Colorado, Idaho, Maryland,

Michigan, Montana, New York, Oklahoma, Pennsylvania and Utah) the insurance is offered both by private insurance companies and by state companies. In the remaining states the insurance can be obtained only from private companies.

The payment for the insurance averages about two per cent of the pay roll, but there is a minimum charge of $25 or $30 in most states. This means that unless a farmer has a pay roll of, say $1,250 or $1,500, his insurance would cost more than the two per cent of wages. If board and lodging are furnished, they are included as part of the pay roll. A minimum premium is not always charged by the state companies.

Farmers in any state may obtain insurance somewhat like this from private companies. It is in the form of a "voluntary compensation endorsement" to an employer's liability policy. This insurance is similar to workmen's compensation insurance except for a small extra charge if the $25,000 liability limits of the workmen's compensation policy are desired, and except for a few exclusions not present in the workmen's compensation policy (such as double indemnity in case the state law specifies it in violation of the employment of minors). It should be understood that the benefit payable to an injured employee (the amount of which depends on the extent of injury) must be paid in full by the company. The limits of liability referred to are those up to which the company will protect the farmer in case his injured employee refuses the benefits and decides to sue him instead. An advantage of the voluntary compensation arrangement, on the other hand, is that a farmer probably would be able to insure only some of his employees if he preferred, whereas if he chooses to come under his state's compensation act he would have to insure all of them under a workmen's compensation insurance policy.

Workmen's compensation insurance premiums are always, and employer's liability insurance premiums are generally, based on the pay roll, subject to a minimum charge. But a few companies write the employer's liability insurance on the basis of so much per year for each worker.

The farmer who has a mortgage on his farm and who has gone heavily into debt to stock and equip it particularly needs insurance against the hazards that would hurt him most financially. Relief from worry makes for better farm planning.

BEEF CATTLE

Marketing Alfalfa-Brome ....Jan., 1952
Silage for Beef Cattle .....Feb., 1952
Spuds into Steers .....Feb., 1952
Cheaper Beef Gains .....Mar., 1952
Hormones Lower Beef Costs .Mar., 1952
Nutrition During Gestation ..Mar., 1952
The Best Steer to Eat Grass..Apr., 1952
Beefmasters .....Apr., 1952
Lowering Beef Cattle Costs ..Apr., 1952
Brangus Cattle .....Apr., 1952
Know-How Raises
Quality Beef .....Sept., 1952
Calving to Market at 15 Mos. May, 1952
Will Feeder Cattle Pay .....Oct., 1952
Make Beef for 14 Cents .....Oct., 1952

CONSERVATION

Flood Control Program .....Jan., 1952
Clean Streams .....Jan., 1952
New Nursery Methods .....Feb., 1952
Ground Cover for Sandy Soils.Apr., 1952
A Valley Is Reclaimed .....Oct., 1952
Earth Takes Big Drink .....Oct., 1952

CROPS

Feed Your Forage Crops ....Feb., 1952
Producing Small Grain .....Feb., 1952
How Does Your Corn Grow?.Mar., 1952
Ladino Clover .....Mar., 1952
How to Choose Hybrid Corn.Apr., 1952
More Corn on Less Land ....Apr., 1952
Corn Production .....Apr., 1952
Growing Brome Grass .....May, 1952
A Corn Champion's Story ....May, 1952
Make Corn Your Nurse Crop..May, 1952
Irrigation .....May, 1952
Better Grass for More Corn ..May, 1952
Red Clover Comes Back .....July, 1952
Why I Believe
in Conservation .....Sept., 1952
Costs to Harvest Grass Silage.Oct., 1952

DAIRY CATTLE

Less Udder Trouble .....Jan., 1952
A New Market for Milk .....Jan., 1952
Let the $ Sign Be Your Guide .Feb., 1952
Using Nurse Cows .....Feb., 1952
Sundown for the Milk Can ..Feb., 1952
Calf Scours Controlled .....Mar., 1952
Hunting Identical Twins ....Mar., 1952
Outwitting Mastitis .....Mar., 1952
Typed Classifications .....Mar., 1952
New Breeding Remedy .....Apr., 1952
How Much Milk Will a
Cow Give? .....Apr., 1952
Herd Sire Index .....Apr., 1952
Cow Comfort and Ventilation.Apr., 1952
Improving Dairy Herds .....Apr., 1952
Calves Need Roughage .....Apr., 1952
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Calf Management .....May, 1952
Herd Sire Problem .....July, 1952
Improve Butterfat Test .....July, 1952
Cut Chore Time .....July, 1952
Bloat, an Old Trouble .....Sept., 1952
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Milking Machines .....Sept., 1952
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New Cure for Trichomoniasis.Oct., 1952
Planning for Dairy Profits ..Oct., 1952
Take Advantage of Architecture
of the Cow .....Oct., 1952

FARM BUILDINGS

Cow Comfort and Ventilation.Apr., 1952
Top-of-Ground Silos .....Sept., 1952
Pole Type Poultry Shelter ...Oct., 1952

FARM MANAGEMENT

Farm Doubles Its Production.Feb., 1952
Cutting Production Costs ....Mar., 1952
Livestock Bruises Cost
Money .....Mar., 1952
When You Buy Credit .....Apr., 1952
I'll Be Suing You .....May, 1952
Oil Under Your Farm? .....May, 1952
Don't Buy a Fooler Farm ...July, 1952
Lease That Will Last .....July, 1952
Air Service for Farmers .....Sept., 1952
Farm Fire First Aid .....Sept., 1952
$600 Into 2,00 Acres .....Sept., 1952
Road to Efficient Farming ..Sept., 1952
All-Risk Crop Insurance .....Oct., 1952
Biggest Cross-Roads Bank ...Oct., 1952

FARM EQUIPMENT and MACHINERY

Side Opening Milk Cooler ....Jan., 1952
Yard Lighting for the Farm..Jan., 1952
Whirlwind Milking .....Feb., 1952
Periodic Oil Changes .....Feb., 1952
Sundown for the Milk Can ...Feb., 1952
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Fuel for Farm Tractors .....Apr., 1952
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FEEDS

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Make Good Use of
Your Feeds .....Feb., 1952
Results in Livestock Feeding.Feb., 1952
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Report on Hay Crushers ....Sept., 1952
He Feeds Everything
That Grows .....Oct., 1952

FERTILIZERS and COMPOSTS

Rotation Fertilization .....Jan., 1952
Mineral Needs of Livestock ..Feb., 1952
Manure—Top Soil Builder ...Mar., 1952
New Soil Conditioner .....Mar., 1952
Cornstalks Decrease Yields ..Sept., 1952
Topdressing Meadows
and Pastures .....Sept., 1952
Get Organic Matter Quick ...Oct., 1952

FORESTRY

Be Your Own Woods Boss ...Mar., 1952
Put the $ Sign on Decay ....Feb., 1952

FRUIT

Controlling Mice in Orchards.Dec., 1951
Balanced Pruning of Grapes..Feb., 1952
Spraying Apples
for Less Money .....Sept., 1952

HOGS

A Breeding Plan .....Dec., 1951
Time Isn't Important to Hog..Jan., 1952
Feeding Your Swine .....Jan., 1952
The Sow Is Half Outdated ...Feb., 1952
Monthly Hog Check .....Mar., 1952
Better Hog Production .....Apr., 1952
Antibiotics for Pigs on Pasture .....Apr., 1952
Infectious Rhinitis .....May, 1952
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Self-Feed Nursing Sows .....May, 1952
Hogs Need Less Protein .....July, 1952
Raise Every Pig .....July, 1952
New Antibiotic Pig Pellet ...Oct., 1952
Pastured Pork Costs Less ...Oct., 1952

INSECTS and INSECTICIDES

New Farm Chemicals .....Apr., 1952
Pest Control .....July, 1952

PASTURES

The Grass You've Wanted ...Jan., 1952
Soil Fertility and Pastures ..Mar., 1952
New Pasture Every Morning..Mar., 1952
Control of Broomsedge .....Apr., 1952
Improve Pastures—It Pays ..May, 1952
Grass Cuts Milk Costs .....July, 1952
Plan for Pasture .....July, 1952
Ladino Can Take It .....Sept., 1952
Worth $100 an Acre .....Sept., 1952
Banded Fertilizers for Legumes .....Oct., 1952
Irrigate Pastures .....Oct., 1952
Balbo Rye .....Oct., 1952
Cascade Lotus .....Oct., 1952

POULTRY

Cholera in Turkeys .....Dec., 1951
Good Ventilation Pays .....Jan., 1952
Heat Lamps in Brooding Chicks .....Jan., 1952
Losses From Intestinal Parasites .....Jan., 1952
Eggs and Health Make Flock Pay .....Jan., 1952
Turkey Broilers .....Jan., 1952
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Hormonizing Chickens .....May, 1952
How Much From 500 Layers?..May, 1952
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Barnyard Goose .....July, 1952
Farm Assembly Line .....Sept., 1952
Gozzis' Turkeys Sell Retail ..Oct., 1952
Poultry Practices That Pay ..Oct., 1952

SHEEP and GOATS

Death to Sheep Parasites ....Dec., 1951
Increasing Returns From Wool .....Feb., 1952
Parasites Take Sheepman's Profit .....Mar., 1952
Sheep Industry in Ohio .....May, 1952
Money in Sheep .....July, 1952
Two Lamb Crops a Year ....Sept., 1952
Breeding, Feeding for Wool .Oct., 1952

SOILS

Improving Tilth .....Nov., 1951
Soil Fertility and Human Nutrition .....Jan., 1952
Soil Fertility and Pastures ..Mar., 1952
Is My Soil Deficient? .....Mar., 1952
Manure—Top Soil Builder ...Mar., 1952
New Soil Conditioner .....Mar., 1952
Is Your Farm Hungry? .....Apr., 1952
Atoms Aid Plant Research ...Apr., 1952
Test Your Soil Vocabulary ...May, 1952
Soil Organic Matter .....July, 1952
Land Judging Contest .....Oct., 1952

VEGETABLES

If You Want Early Tomatoes..Apr., 1951
Backyard Hidden Treasure ...Oct., 1951

WEEDS

Check Your Weed Sprayer ...Oct., 1951
Grub Out Buckthorn .....Dec., 1951
TCA Controls Johnson Grass..Dec., 1951
Don't Put Up With Garlic ...Jan., 1952
Brome Will Strangle Quackgrass .....Jan., 1952
Killing Weeds With Chemicals .....Feb., 1952

MISCELLANEOUS

U. S. Fact-Finders Abroad ...Dec., 1951
Indian John .....Dec., 1951
F.A.O.—Bulwark of Freedom..Jan., 1952
A Long-Drawn Question .....Jan., 1952
How Allies in Europe Farm ..Jan., 1952
Antibiotics and Plant Protection .....Jan., 1952
Fifty Years of Plant Science..Feb., 1952
Weather Signs—Fact or Fable .....Feb., 1952
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History of Agricultural Fairs..Mar., 1952
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Water Well Drilling .....July, 1952
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The Identification and Judging of Crops, Weeds and Plant Diseases — By Harold K. Wilson and Alvin H. Larson. Spiral binding. 1940. Webb Pub. Co. Much in demand for agricultural classes. Used also in the Veteran's Farm Training Program $1.25

Farm Business Management — By Robertson and Woods. 1951. 546 pages, 248 illustrations. J. B. Lippincott. Prepared for use in all farm management and marketing courses. Combines the most up-to-date and authoritative content with the best farming practices available today in the field of farm management $3.80

The Hog Annual — Published by Farm Quarterly Magazine. March, 1952. Approximately 500 pages. First complete hog annual ever published. Contains names of all breed associations, secretaries, pig hatcheries, livestock yards, livestock commission salesmen, all of the hog farmers who sell over 400 hogs a year—fine articles on housing, sanitation, breeding and farrowing ...$5.00

Feeds and Feeding — New Edition (Abridged) — Published May, 1949. By Professor F. B. Morrison, Cornell University. 630 pages. Illustrated. $3.50

Cowphilosophy — By Mark Keeney. Second edition to which has been added the "Herdsman's Corner" and new material by the author. Fifty per cent larger. Holstein-Friesian World. A best seller since its first appearance in 1939. No agricultural book ever received a more enthusiastic reception from breeders and educators. Many college professors made Cowphilosophy required reading for their advanced classes in animal husbandry $3.00

Livestock Health Encyclopedia — By Seiden. Published November, 1951. Springer Publishing Company. Most recent veterinary book published, over 600 pages of helpful and useful information on how to diagnose and treat every ailment of livestock. Well illustrated $7.50

Hunger Signs in Crops — By the National Fertilizer Association. Clothbound. Published by 15 experts. Shows by accurate color photos how different crops appear when they lack essential plant foods and trace elements. Now completely revised and enlarged, 370 pages of text and illustrations. It is accurate, easy to understand and the information can be put to practical use on the farm $4.50

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The Insect Guide —By Ralph Swain. Illustrated in beautiful natural colors. 454 illustrations. 330 in full color. 261 pages. Published 1948. Blakiston. Covers practically all North American insects. Each $3.50

Financing the Farm Business — I. W. Duggan and Ralph U. Battles. Approximately 350 pages, illustrated. Published 1950. John Wiley & Sons. Here is the most practical and useful book on farm finance ever written. It tells the present or potential farmer how to get the credit he needs to lease, buy or operate a farm without burdening himself hopelessly with debt $5.00

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YOU CAN LOSE IT ALL IN A MINUTE . .

IF YOU haven't checked your insurance coverages in the last few years, it is high time you did. You probably will find your needs have changed. In fact, you may avoid being caught short on a loss that could mean financial ruin. High building replacement costs and high jury awards are making obsolete old ideas of fire and liability coverages.

To cite an example: The large dairy barn burned on the farm owned by a man who has been a leader in bringing business methods to dairymen. Contractors estimated a new barn of latest design would cost up to $22,500. But he had only $7,000 insurance on the old barn. Too old to assume a long-time financial burden, he chose to sell at what the farm would bring without a barn. This same tragedy in different degree is hitting farmers all over the country.

Until a few years ago, the standard $5,000/10,000 auto liability coverage was considered adequate. Now many thoughtful drivers won't venture out with less than $100,000/200,000 coverage. Why? Because today's juries are awarding up to $200,000 for injuries, not to mention deaths. Some juries, observers say, even award damages when defendant is not liable and plaintiff is to blame. Insurance costs are higher, but these big losses surely can't be paid from farmer's savings. If you are concerned with farm insurance, the article on page 87 may be worth a great deal to you. . . .